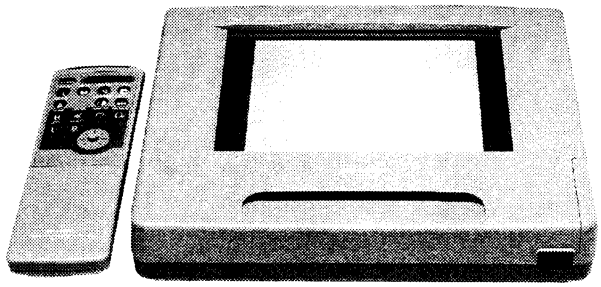
SHARP SERVICE MANUAL

S4537QA-1400/



COMPUTER PROJECTION PANEL

MODEL QA-1400

- In the interests of user-safety the set should be restored to iits original condition and only parts identical to those specified be used.

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SHARP CORPORATION

1. INTRODUCTION

This unit is a portable computer projection panel.
It employs a high contrast, high response, 8.4-inch TFT liquid crystal display panel,which can generate a maximum of 1,700,000 different colors. It offers a computer graphic screen which responds in real time.
Moreover, the built-in composite video circuit can receive video signals of VCR, laser disc and so on, making a wide presentation possible.
Their controls and images can be adjusted with the remote controller or main-body's buttons referring to the menu screen.
If the optional back-light un7it is used, it can be also used as the stand-alone display.

This unit can be used with the following models and signals.

1.Personal computers
   1) IBM, PC/XT, PC/AT, PS/2, PS/1, PS/55, Think Pad 700
   2) Apple, MACII, MAC+/SE, MACIIcx, MACIIci, MACIIsi, MAC LC, Power Book 160/180, Quadra
   3) AT&T, PC6300WGS
   4) SHARP, AX286/386

2.Video adaptors and signals
   1) IBM, MDA(720X350)
   2) IBM, CGA(640X200)
   3) IBM, EGA(640X350)
   4) IBM, MCGA(640X400, 640X480)
   5) IBM, VGA(640X350, 640X400, 640X480, 720X400)
   6) Apple, MACII Video Card (640X480)
   7) Apple, MAC LC (640X480, 512X384)
   8) Hercules, Graphic Card/Plus/Incolor Card (720X348, 720X350)
   9) Composite video signals (PAL/NTSC/SECAM)

3.Mouse
   1) Macintosh series mouse
   2) PS/2 mouse
   3) RS-232C mouse

2. SPECIFICATIONS

1.SPECIFICATIONS OF MAIN BODY

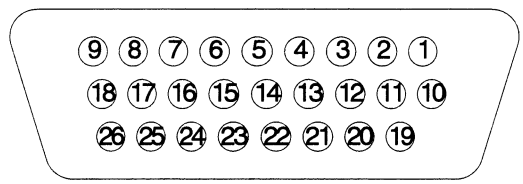
1.Display unit	:8.4-inch TFT color LCD
2.Display color	:1,700,000/4,096 colors
3.Display area	:170.88X129.6mm
4.Number of pixels	:640X(RGB)X480 pixels (pixel = R+G+B dots)
5.Input video signal	:TTL level R,G,B,r,g,b, Hsync, Vsync
	TTL level R,G,B,I,Hsync, Vsync
	TTL level Video, I, Hsync, Vsync
	Analog IBM PS/2 type VGA signal
	Analog Apple Macintosh II video card signal
	Composite video signal (NTSC/PAL/SECAM)
6. Input / output connector	:Composite video input connector (1)
	26-pin computer signal input HD connector (1)
	15-pin outer monitor output connector (1)
	Serial interface port (1)
	Mouse control port
	12 DC input socket (1)
7. Switches and others	:Power switch
	Menu button (1), mode select button (1),
	Mode adjustment button (2), reset button (1)
8. Adjustment	:Color adjustment, Brightness adjustment, Tint adjustment
	Image horizontal/vertical position adjustment
	Phase adjustment,Frequency adjustment
	Contrast adjustment
9. Functions	Software reset
	Remote control function
	PC control (serial interface port)
	Enlargement function
	Image clear function
	Input video signal auto-discrimination function
	Front/Rear display switch
	Adjustment state holding function
	Menu screen control
10. Outside dimensions	:330(W)X270(H)X56(D) [mm]
	(13.0(W)X10.6(H)X2.2(D) [inches])
11. Weight	:Approx. 2.5kg (main body alone)
	(Approx.5.51lbs(main body alone))
12. Others	:Display surface cooling ventilation function
	(Forced air-cooling fan motor integration)

2.SPECIFICATIONS OF INTERFACE

2.1.Computer signal input

Input signal layout:

1.Digital second green (g,l)	14.Analog green return
2.Digital second blue (b, Video)	15.Analog red return
3.Digital second red (r)	16.Digital GND
4.Analog blue	17.N.C.
5.Analog green	18.N.C.
6.Analog red	19.Vsync (digital)
7.Analog GND	20.Hsync/Csync (digital)
8.Test 1 (MAC II, MAC LC)	21.N.C.
9.Test 2 (D/A)	22.N.C.
10.Digital green	23.Digital GND
11.Digital red	24.Digital GND
12.Digital blue	25.Digital GND
13.Analog blue return	26.N.C.



Connector :Subminiature D 26-pin connector
AMP 748481-6 (recommendable plug housing: AMP 748365-1) or
JST KAY-26S-2A3F14(recommendable plug housing: JST KAC-26P)
or equivalent

Test 1 terminal :It is necessary to set LOW (GND) for input of Apple Macintosh II Video Card and Macintosh LC signal and OPEN (N.C.) for use of other video input signals.

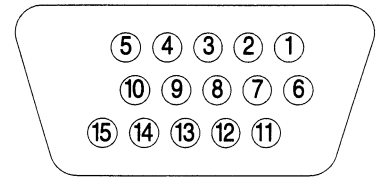
Test 2 terminal :It is necessary to set LOW (GND) for input of analog video input signal and OPEN (N.C.) for video input.

(*) :The digital video input (1,2,3,10,11,12) and analog video input (4,5,6) can not be used at the same time.
It is necessary to set OPEN (N.C.) for the input which is not used.

2.2.External monitor output

Signal layout

Pin No.	Signal
1	Analog red (75 Ω load)
2	Analog green (75 Ω load)
3	Analog blue (75 Ω load)
6	Analog red return
7	Analog green return
8	Analog blue return
5	Digital GND
10	Digital GND/ SHIELD
11	Digital GND
13	Hsync (digital)
14	Vsync (digital)
4,9,12,15	N.C.



Connector :Subminiature D 15-pin connector
JST EKHEY-15S-IF3P14-143
(applicable plug housing: JST KEC-15P)
Output level :Input level ±10% (75Ω load)
(analog RGB output alone)

2.3.Composite video signal input section

Connector :Pin jack (EIAJ RC-6703A)

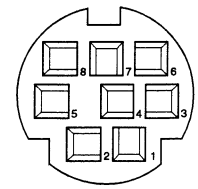
2.4.Power input section

Input pin :HEC0470-01-640 [Hoshiden Co., Ltd.] or equivalent
Center pin +
AC adaptor :Accessory AC adaptor DADP-2004YAZZ
Input voltage :DC12V (when main body is loaded) 1.95A

2.5.Serial interface port

Serial Interface port

No.	SYMBOL	SIGNAL NAME	STATUS
1	GND	Signal GND	-
2	SD	Transmit Data	O
3	RD	Receive Data	I
4	RS	Request to Send	O
5	CS	Clear to Send	I
6	DR	Data Set Ready	I
7	GND	Signal GND	-
8	ER	Data Terminal Ready	O



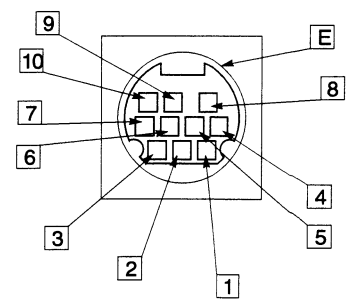
Connector :Mini Din-8pin(Standard type) connector

In order for the CPP to transfer data to the computer, the CS and DR input lines on the computer side both be ON.

2.6.Mouse control port

Mouse control port

No.	SIGNAL NAME	STATUS	SIGNAL LEVEL
1	Transmit Data	O	RS-232C
2	Data Set Ready	I	RS-232C
3	Selecter1	I	GND or N.C.
4	GND	-	-
5	Vcc(5V)	-	-
6	DATA1	I/O	INPUT:TTL OUTPUT:V_{OH}=VCC V_{OL}=GND
7	Selecter2	I	GND or N.C.
8	DATA2	I/O	INPUT:TTL OUTPUT:V_{OH}=VCC V_{OL}=GND
9	NC	-	
10	NC	-	



Connector :Mini Din-10pin connector

3.SPECIFICATIONS OF ENVIRONMENT

Basically, these environment specifications apply to the main body and its accessories.

Item		Specification	Remark
Power	Type	Single-phase 2-wire type, one ground line	Special AC adaptor accessory is used.
	Frequency	50 / 60 Hz	
	Input voltage	AC 100 ~ 240V	
	Power consumption	32 W	
Operation	Operating temperature	0 to 30 °C(The LCD surface temperature must be 45 °C or lower.)	Without dew condensation
	Operating humidity	Ta ≤ 40 °C: 90%RH Ta ≤ : Absolute humidity must be less than TA=40 °C/90%RH. (Ta: Surface temperature of LCD)	
Storage	Storage temperature	-20 °C~ 60 °C	
	Storage humidity	Same as the operating humidity condition	

3. ADJUSTMENT OF P.W.B.

The QA-1400 has two printed-wiring boards (PWB) that need to be adjusted, the power supply and the control boards.
The following paragraphs describe how to adjust these PWBs. Correct adjustments are essential for the unit to operate properly. After repair or maintenance, it is necessary to readjust them. Before adjusting the control PWB, be sure to verify that the power supply is adjusted, and then adjust the control PWB.

1. ADJUSTMENT OF POWER SUPPLY P.W.B.

There are three power voltage adjusting points: VR1 for V-CPU, VR2 for V-LCD and VR3 for FAN 8V.

1) Connect the AC adaptor connector plug to CN1.
   Verify that the output of AC adaptor approximates 12V.
2) Vcpu adjustment
   Connect the + lead of DC voltmeter to TP4, and the - lead to the fixed angle of the power switch.
3) Before turning on the power switch, check the following:
   The fan motor is connected to CN3 and CN4.
   The main PWB is connected to CN2.
   Check the conductive pattern on the rear of the PWB for defects or foreign material that may short the conductive paths.
4) Turn on the power switch SW1 to verify that the fan motor runs.
5) While turning VR1 with a flat-tipped screwdriver, observe the voltmeter.
   Adjust the voltage to 5.15±0.2V.
6) VCC voltage check
   Connect the + lead of the DC voltmeter to TP3. Verify the voltage of 4.90 to 5.15V.
7) V-LCD adjustment
   Connect the + lead of the DC voltmeter to TP2.
   While turning VR2 with a flat-tipped screwdriver, observe the voltmeter.
   Adjust the voltage to 5.05±0.05V.
8) FAN 8V adjustment
   Connect the + lead of the DC voltmeter to TP8, insure SW2 is on(closed).
   While turning VR3 with a flat-tipped screwdriver, observe the voltmeter.
   Adjust the voltage to 8.0±0.1V.
9) +10V voltage check
   Connect the + lead of the DC voltmeter to TP5. Verify the voltage of 10±0.5V.
10) -10V voltage check
   Connect the + lead of the DC voltmeter to TP6. Verify the voltage of -9.3 to -11.3V.
11) VPP voltage check
   Connect the + lead of the DC voltmeter to TP1. Verify the voltage of 12±0.55V.
12) When SW2 is off, verify that the voltage across both ends of CN3 is in the range of 10 to 12V.

2.ADJUSTMENT OF CONTROL P.W.B.

2.1.Offset adjustment of computer signal input amplifier

1) Turn off the power, and connect TP301 and TP303 to an oscilloscope.
   (Connect the earth terminal of the probe to the fixed angle of the power switch.)
2) Input the signal of Fig. 1-B to CN3.
3) Turn on the power. Observing the oscilloscope, adjust the TP303 level to be equal to TP301 level by turning VR303 with the flat-tipped screwdriver.
   (Approx. 1V voltage is output at TP301.)
4) Turn off the power, and reconnect the probe from TP303 to TP304.
5) Turn on the power, and verify that TP301 and TP304 are at the same level.
6) Turn off the power, and reconnect the probe from T304 to TP305.
7) Turn on the power, and verify that TP301 and TP305 are at the same level.

2.2.Gain adjustment of computer signal input amplifier

1) Turn off the power, and connect TP303 and TP300 to an oscilloscope.
   (Connect the earth terminal of the probe to the fixed angle of the power switch.)
2) Input the signal of Fig. 1-C to CN3.
3) Turn on the power. Observing the oscilloscope, adjust the TP303 level to be equal to TP300 level by turning VR300 with the flat-tipped screwdriver.
   (Approx. 3.8 voltage is output at TP300.)
4) Turn off the power, and reconnect the probe from TP303 to TP304.
5) Turn on the power. Observing the oscilloscope, adjust the TP304 level to be equal to TP300 level by turning VR301 with the flat-tipped screwdriver.
6) Turn off the power, and reconnect the probe from T304 to TP305.
7) Turn on the power. Observing the oscilloscope, adjust the TP305 level to be equal to TP300 level by turning VR302 with the flat-tipped screwdriver.

2.3.VCO adjustment

1) Connect the + lead of the DC voltmeter to TP207, and the - lead to the fixed angle of the power switch.
2) Input the video timing of Fig. 1-A to CN300.
3) After turning on the power, leave it as it is for approx. 3 minutes.
   Then turn L200 with ceramic driver to adjust the voltage of TP207 to 2.5±0.05V. (*1)
4) Input the video timing of Fig. 1-B or C to CN300.
5) Then turn L201 with ceramic driver to adjust the voltage of TP207 to 4.4±0.05V. (*2)

(*1) Since the voltage of TP207 varies depending on the material of the driver used, keep the driver away from the core when checking the voltage.
(*2) It is factory-adjusted at the timing of PC9801 640X400 at shipment.

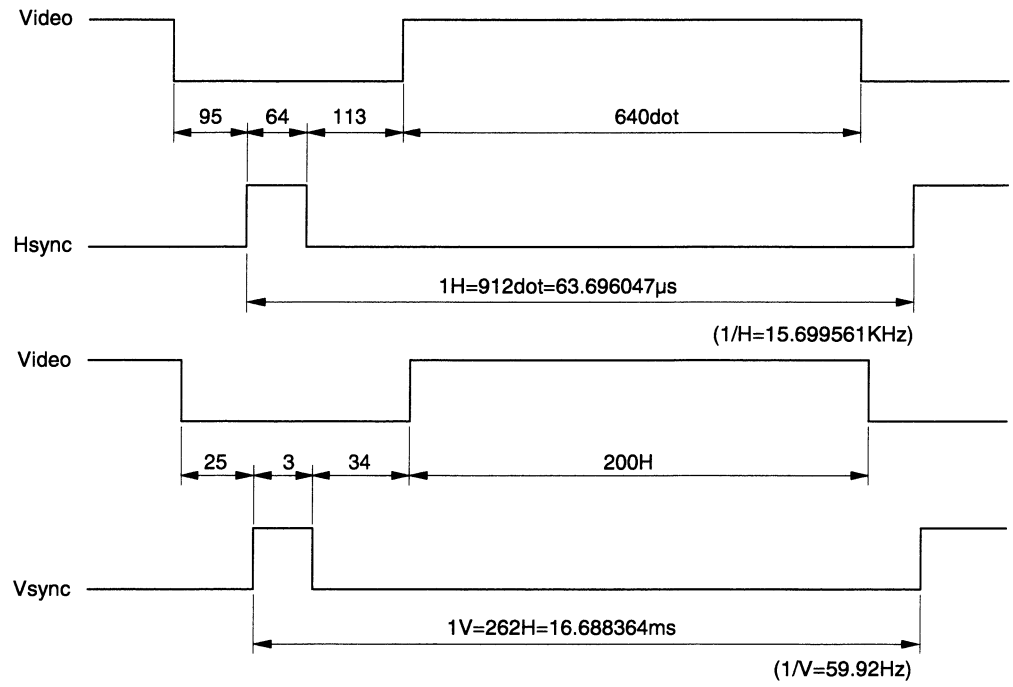


Fig. 1-A IBM CGA 200-line 40-character

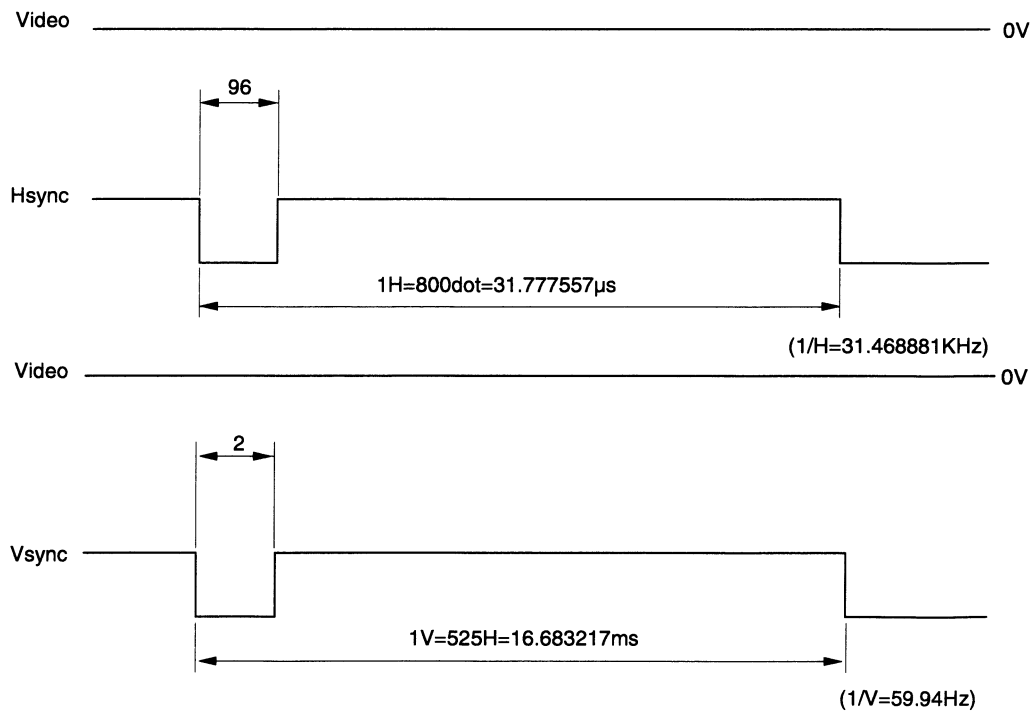


Fig. 1-B IBM VGA 480-line Black-solid

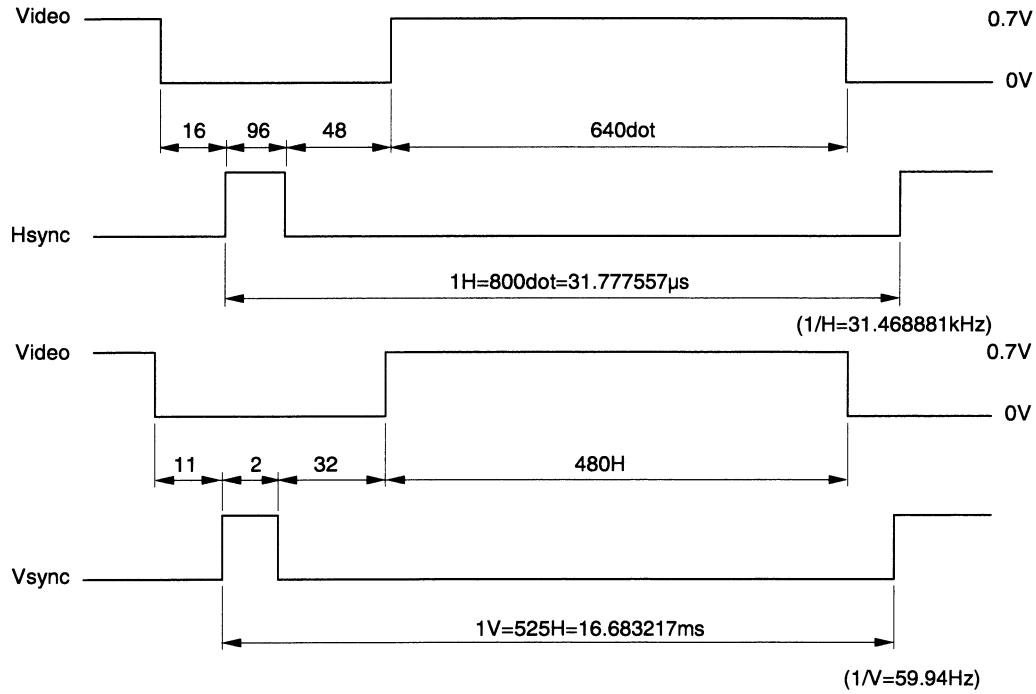


Fig. 1-C IBM VGA 480-line

4. CIRCUIT DESCRIPTION

1. GENERAL

Circuit will be described in reference to the QA-1400 block diagram in Fig. 2.
Composite video signal which enters via pin jack connector is converted into the digital RGB in the composite video input circuit by the control signal from the I^2C bus controller, and then enters the signal selector circuit.
Computer analog signal from IBM PS/2 or Apple MACII enters via the 26-pin connector, passes through the computer analog input circuit and A/D conversion circuit, is converted into the digital RGB signal, and enter the signal selector circuit.
Digital video signal from IBM PC EGA or CGA enters via the 26-pin connector is input into the signal selector circuit.
The signal selected in the signal selector circuit is written into the field memory. The writing operation into the field memory is controlled by FROGW, FGOGW, FBOGW, FWCK and FWRS signals which are generated in the IC100 by HSYNC. VSYNC. Since the LCD control is asynchronous with the computer signal, FRCK and FRRS is generated within IC100. The computer signal is then read out at their timings.
The enlarged display function is readied by setting signals FRAS and FRAD, which are generated by IC100. In the IC100, data read out from the field memory is processed in the color compensation, screen mask process and menu screen display process, and is converted into the LCD display data.
In addition, the mouse control and serial port control signal are supported by IC403. Since control data from the key or remote controller is stored into EEPROM, the set data is memorized even if the power is turned off.

2. COMPUTER SIGNAL INPUT CIRCUIT

In addition to composite video signal, QA-1400 can receive the computer analog RGB signal of IBM PS/2 and Apple MACII and the computer digital RGB signals of MDA, CGA, EGA and so on of IBM PS/AT/XT. These signals enter each input circuit via the 26-pin connector (CN300) and pin jack (CN600). After they are converted into the digital signals, they are input to the signal selector or directly to the signal selector circuit.
This is explained in the following figure.(Refer to Fig.3)

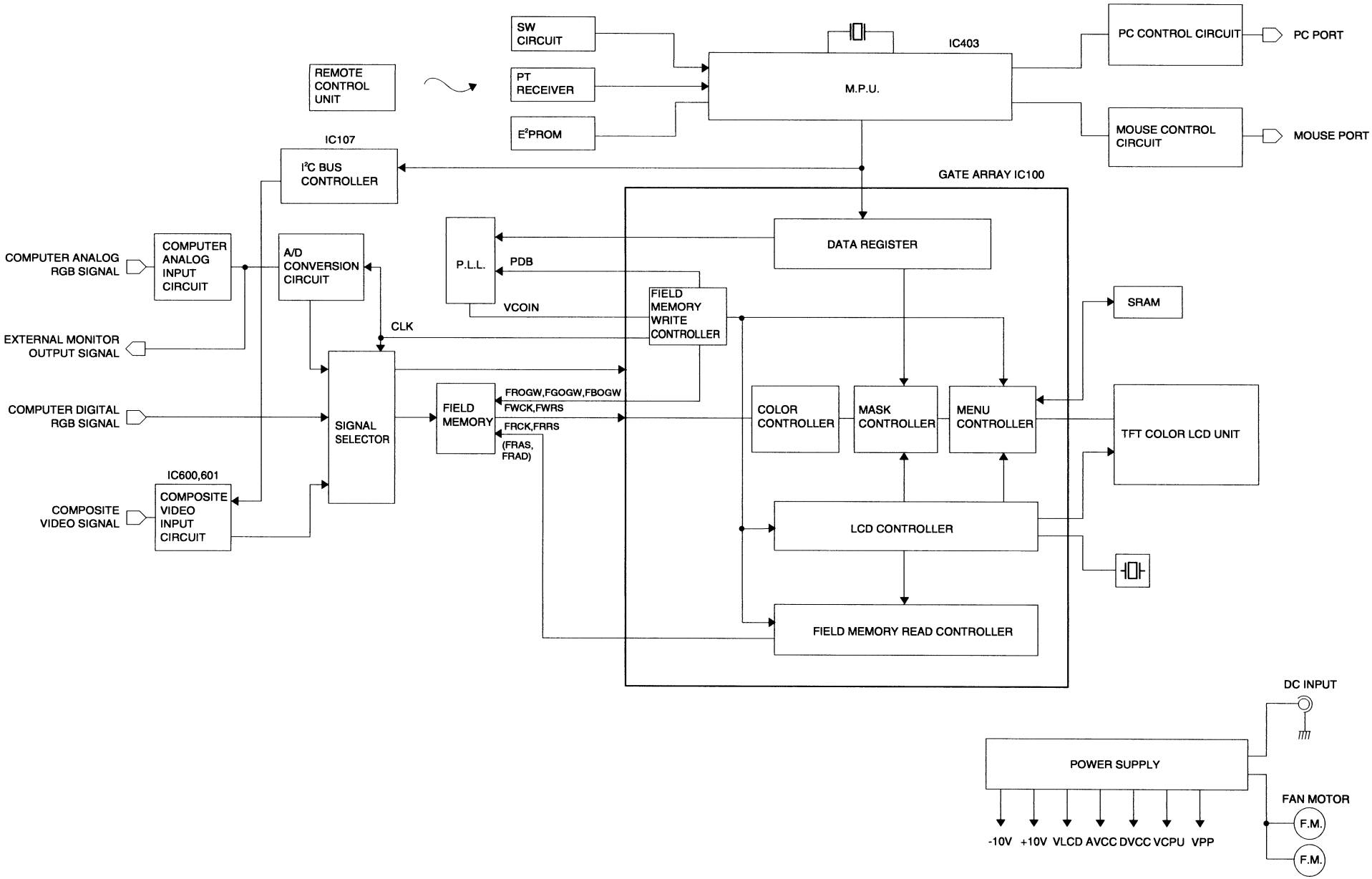


Fig. 2 QA-1400 Block Diagram

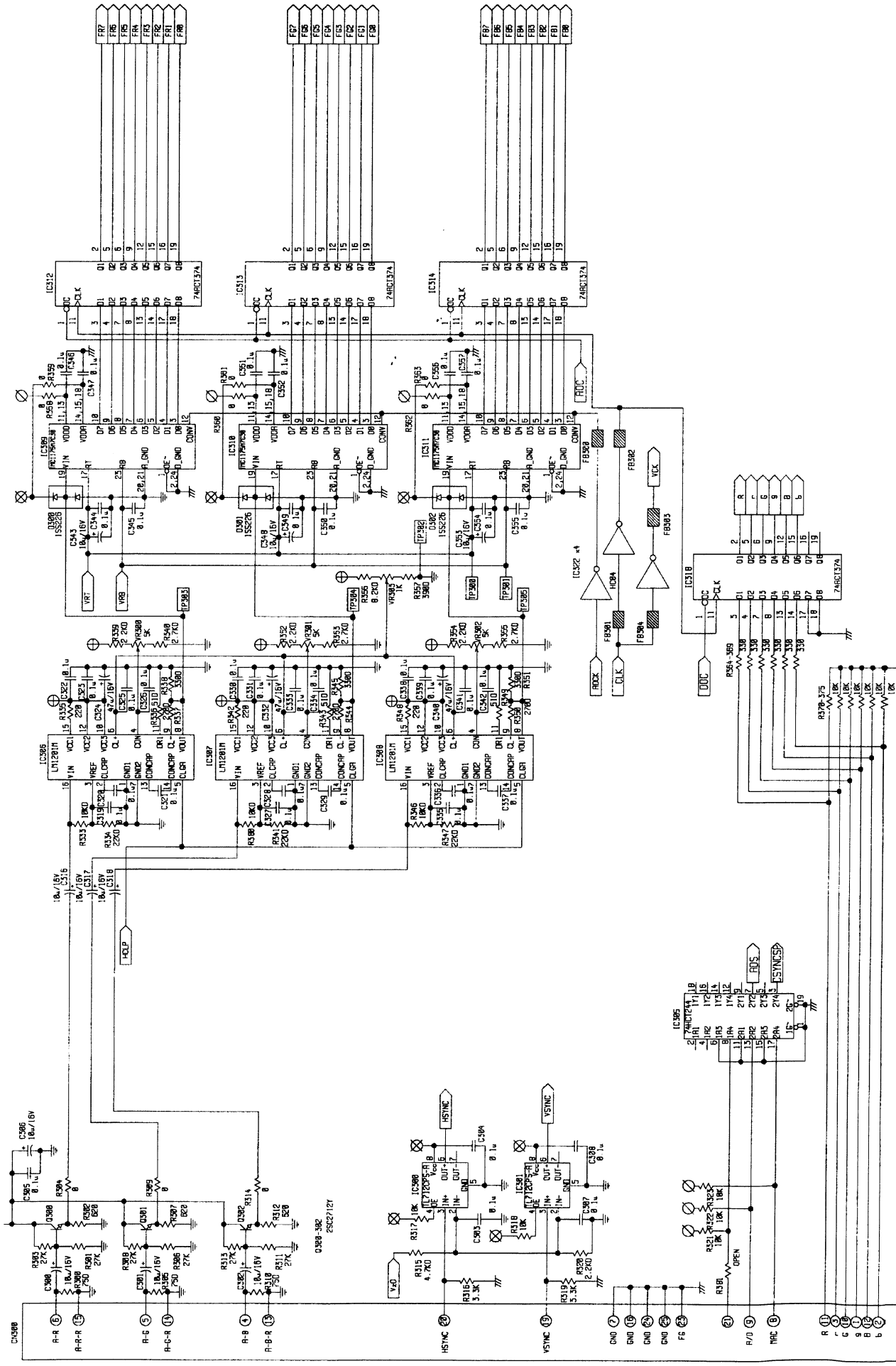


Fig. 3 Computer Signal Input Circuit

2.1.Computer digital signal input circuit

The computer digital signal is input to Pins 1, 2, 3, 10, 11 and 12 of CN300, and is directly sent to the signal selector.
EGA outputs the video signal at the 6-bit TTL level. (R,G,B.r,g,b)
CGA outputs the video signal at the 4-bit TTL level. (R,G,B,I)
MDA outputs the video signal at the 2-bit TTL level. (Mono, Video, I)
As basic, the pins of CN300 output the following signals.

Table 1

Signal	Connector CN300`s Pin Number								
	1	2	3	10	11	12	19	20	24
EGA	g	b	r	G	R	B	Vsync	Hsync	GND
CGA	I	x	x	G	R	B	Vsync	Hsync	GND
MDA	I	MONO	x	x	x	x	Vsync	Hsync	GND

x:Don`t care or N.C.

2.2.Computer analog signal input circuit

IBM PS/2 and Apple MACII output the following analog signals at the load of 75Ω.

Table 2

	Computer Analog Signal		
	R	G	B
IBM PS/2	0.7Vp-p	0.7Vp-p	0.7Vp-p
APPLE MAC II	0.7Vp-p	1.0Vp-p (Synchronization signal overlapped)	0.7Vp-p

The signals are converted into 8-bit digital signals by the A/D converter(IC309~311).
The computer analog signals are given to Pin 19 of the A/D converter, are divided by 256 between the voltages given to Pin 17 and Pin 23, and are digitally converted. The following table shows the reference voltage which is given to the A/D converter.

Table 3

	VH	VL
Threshold Level	3.8V(2.8~4.8V) Adjustment are possible	1.0V

2.3.Threshold level generation circuit

In order to convert the computer and composite analog signal into digital, it is necessary to set the threshold level on the A/D converter. As shown in Fig. 4, VH and VL voltages are set on the basis of the reference power of ZD1. VH can be varied by key operation or remote controller. As the adjusting method from the main body, the mode button and selector button are used to display the contrast adjustment in the screen and to allow the set value to be changed with " △ " and " ▽ " selector buttons. When the remote controller is used, the set value can be changed with "+,-" keys after the contrast key is pressed.

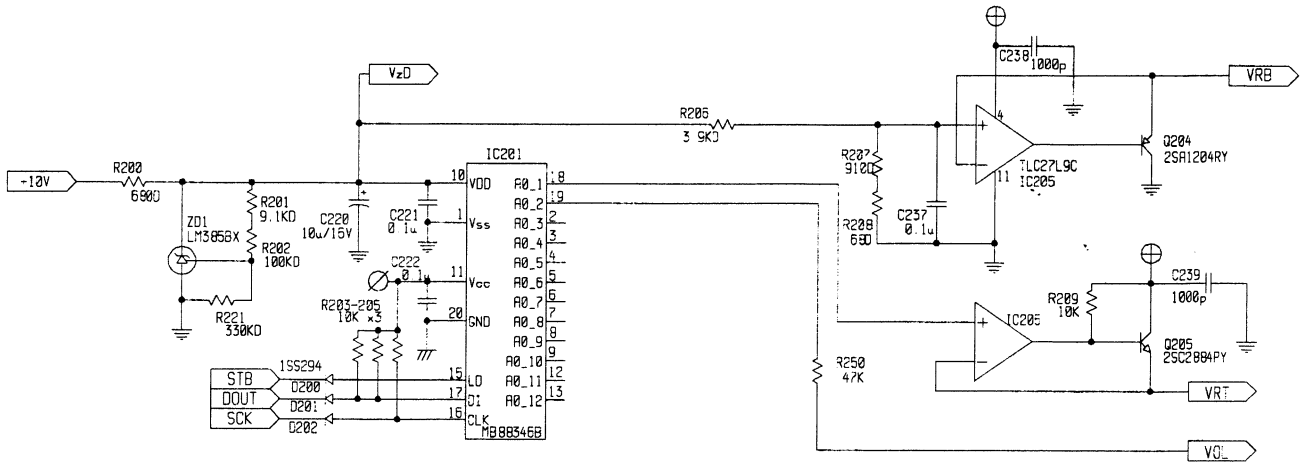


Fig. 4 Threshold Level Generation Circuit

3.VIDEO INPUT CIRCUIT

Fig. 5 shows the block diagram. Circuit diagram is shown in VIDEO CIRCUIT.
This unit automatically switches the circuit corresponding to the composite video signals of NTSC, PAL and SECAM. The composite video signal input to the decoder is first converted into the 8-bit digital YUV signal, and is output as the 8-bit digital RGB from the RGB converter. Horizontal sync signal Hsy, vertical sync signal Vsy, odd signal and system clock LLC2 are simultaneously output from the decoder, and are used in the process circuit in the rear step. Controls of brightness, color and tint, and the initial setting of decoder and RGB converter are sent from MPU by the IIC bus.

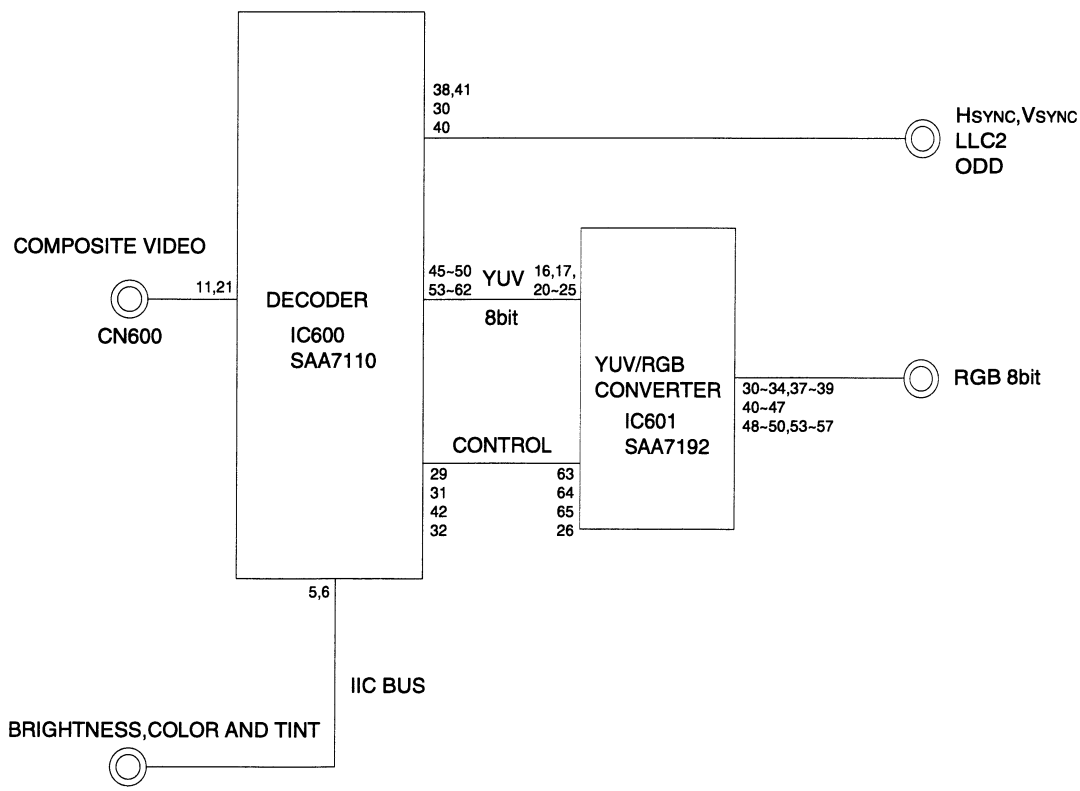


Fig. 5 Composite Video Input Circuit Block Diagram

4. PLL CIRCUIT

The dot clock (VCOIN) is generated by the PLL circuit shown in Fig. 7. The dot clock is necessary to sample the video signal from the computer and change it into the suitable dot data. Hsync signal from computer enters into pin109 on IC100. This signal is compared frequency and phase with the feed-back signal, which is generated from VCOIN by the phase comparator in IC100. If any error of phase or frequency occurs between Hsync and VCOIN, LOW or HIGH level is output at PDB(pin118) of IC100, and when both frequency and phase agree with each other, high impedance is output.

The output signal from the PDB terminal is converted into the DC voltage by loop filter and then controls VCO. VCO is provided with two oscillators (SP1648). IC203 is the oscillator for high band, and IC202 is the oscillator for low band. The oscillation frequency is determined according to the capacity of the varactor diodes (D203,D204) and the inductance (L200, L201). The oscillation frequency is controlled by varying the voltage which is given to the varactor diode.

To select the high band or low band, either VCO is selected according to the signals from No. 120 pin and No. 119 pin of IC100.

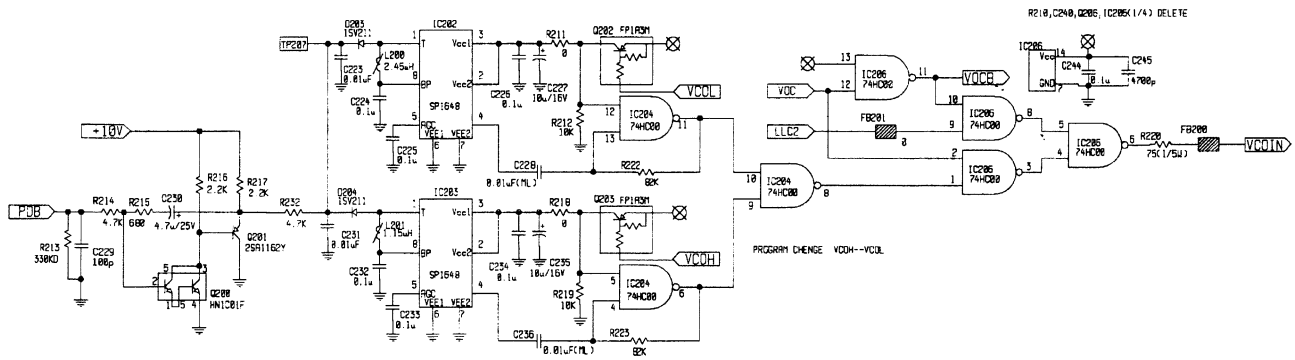


Fig. 7 PLL Circuit

5. MEMORY CIRCUIT

BLOCK DIAGRAM is shown in Fig.2.

5.1.Field memory writing

When data sent from the signal selector is written into the field memory(IC101~103), FWCK (clock slightly later than CLK) generated from the memory controller in IC100 is used.

5.2.Field memory reading

The clock (FRCK) and control signals which are generated in the field memory reading signal generating circuit in IC100 are used to read data from the field memory.

Reading is asynchronous with writing. In the ordinary mode, data written into the field memory are color-compensated and are sent to LCD.

In the enlargement mode, the enlargement control signal is sent to the field memory from the field memory writing/reading signal generating circuit in IC100 to make the enlargement display possible.

5.3.Menu, message display memory

The menu and message display is stored in the ROM area of IC403(MPU).

When the menu button is first pressed, MPU will write data and address into SRAM (IC104) via IC100. Moreover, SRAM data is read via IC100.

The data is sent to LCD at the timing of LCD.

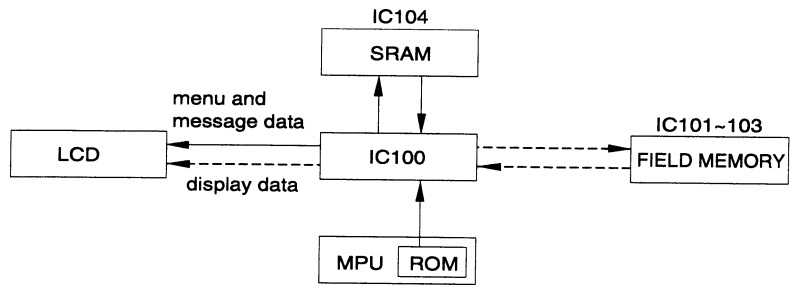


Fig. 8 Memory Circuit Block Diagram

6. VARIOUS FUNCTIONS OF IC403(H8/3256 M.P.U)

IC403 is a microcomputer which is provided with a set of 16-bit free running timer and 2 channels of SCI in addition to 32k-byte PROM/1K byte RAM.

6.1.Key data and various functions

The keys (DOWN, UP, SELECT, MENU, RESET) provided on the main body of QA-1400 switches and selects the adjustment mode displayed in the LCD screen as well as gives the direct commands to IC403.

1) DOWN
   This key decreases the adjustment items selected by the select key, step by step.
2) UP
   Being opposite to DOWN, the key increases the adjustment item, step by step.
3) SELECT
   This key is used to select the adjustment mode in the menu screen which is displayed by the menu key.
   Every push of this key can change the adjustment item, step by step.
4) MENU
   This key is used to switch the menu screen.
5) RESET
   This key is used to set the initial values of the computer. When this key is pressed, the adjustment items are all returned to the initial statuses.
   (automatically set values)

6.2.EEPROM control function

The EEPROM area is provided to write the timing set values of each computer when it is connected to QA-1400. The timing set values are written into EEPROM under the following four conditions.

1. All resetting
2. Resetting
3. Power turn-off
4. The connected computer is changed.

Here, writing into EEPROM is executed only when the set value is changed.

6.3.Reset circuit

The circuit diagram is shown in MAIN CURCUIT No.4.
IC411(TL7705CPS-B) detects the power voltage, Vcpu, of IC403 and its surrounding circuit, and generates the RESET signal. If Vcpu drops below the detection voltage (TYP4.5V) when the power is turned off, IC411 shifts the level of the RESET signal to "low".
If Vcpu rises to exceed the total voltage of the detection voltage V_{S1} and hysteresis width V_{HYS1}(TYP15mV), IC411 starts charging the timing capacitor(C_t) with a constant current. After (T_{P0}=1.3XC_tX10[S]), IC411 shifts the RESET signal to "high" level. (See Fig. 9.)

IC410(S-8054ALB) detects the power voltage Vcc to generate the power OFF signal. If Vcc drops below the detection voltage V_{S2} (TYP4. 15V) when the power is turned off, IC410 shifts the power OFF detection level to "Low".
If Vcc rises beyond the total voltage of the detection voltage V_{S2} and hysteresis voltage V_{HYS2} (TYP200mV) when the power is turned on, IC410 shifts the power OFF signal to "High" level. (See Fig. 10.)

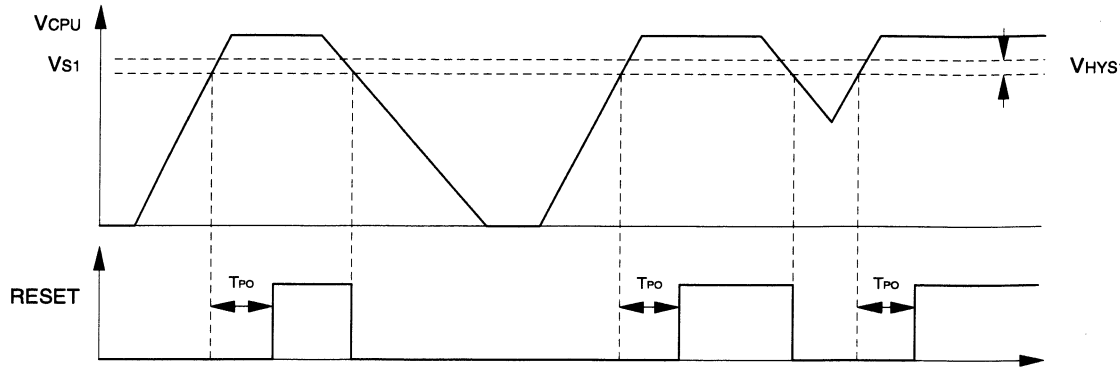


Fig.9

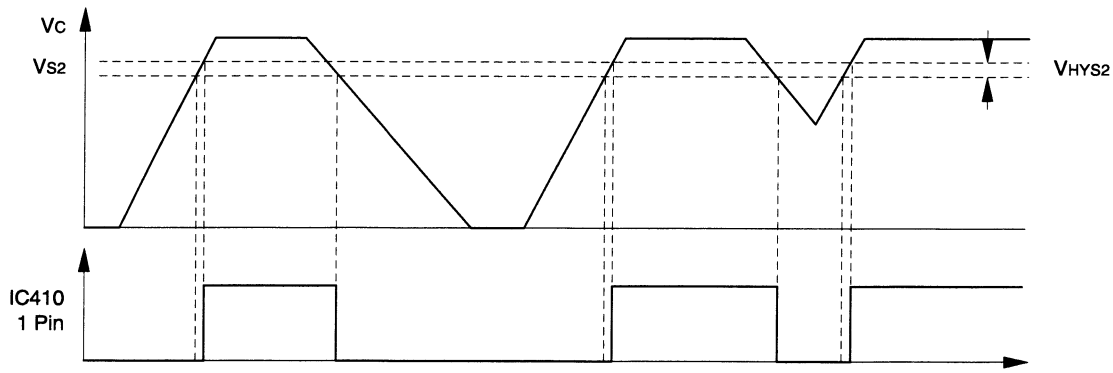


Fig.10

When the power is turned on, V_{LCD}, Vcc and Vcpu rise. If Vcpu exceeds $V_{S1}+V_{HYS1}$, the RESET signal is shifted to "H" level at the timing shown in Fig. 11. The reset operation of IC403 is canceled and execute the program.

When the power is turned off, the power OFF detection signal is shifted to "LOW" when Vcc and V_{LCD} sharply drops below V_{S2}.

On the other hand, Vcpu is backed up by C410 (220mF) so that it can maintain 4.5V for the time of TW after the trailing edge of the power OFF detection signal. See Fig. 12. (TW is the time for IC403 to retreat the data to EEPROM.) If Vcpu drops below V_{S1}, the RESET signal level is shifted to "Low", and IC403 starts resetting.

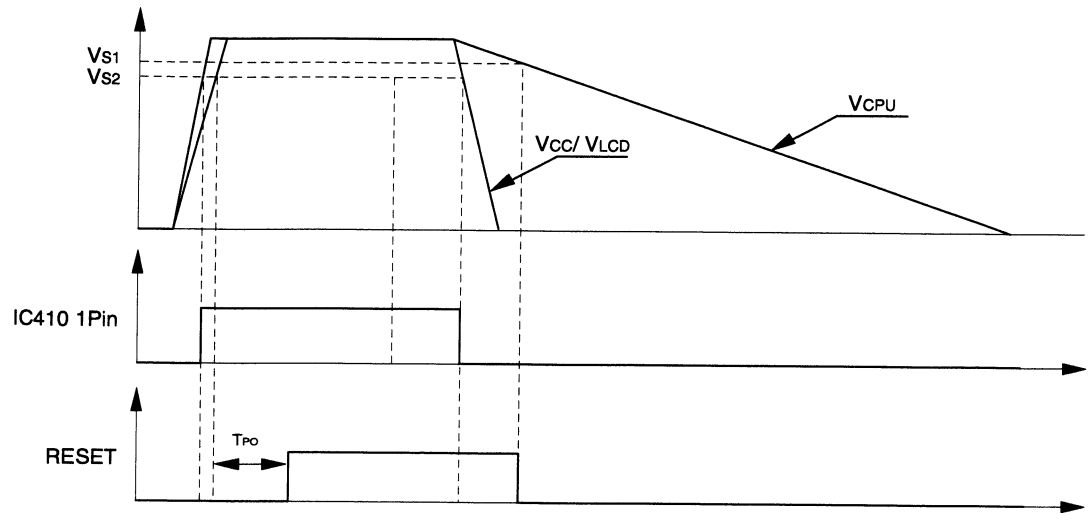

VS1
VS2
VCPU
VCC/ VLCD
IC410 1Pin
RESET
TPO

Fig.11

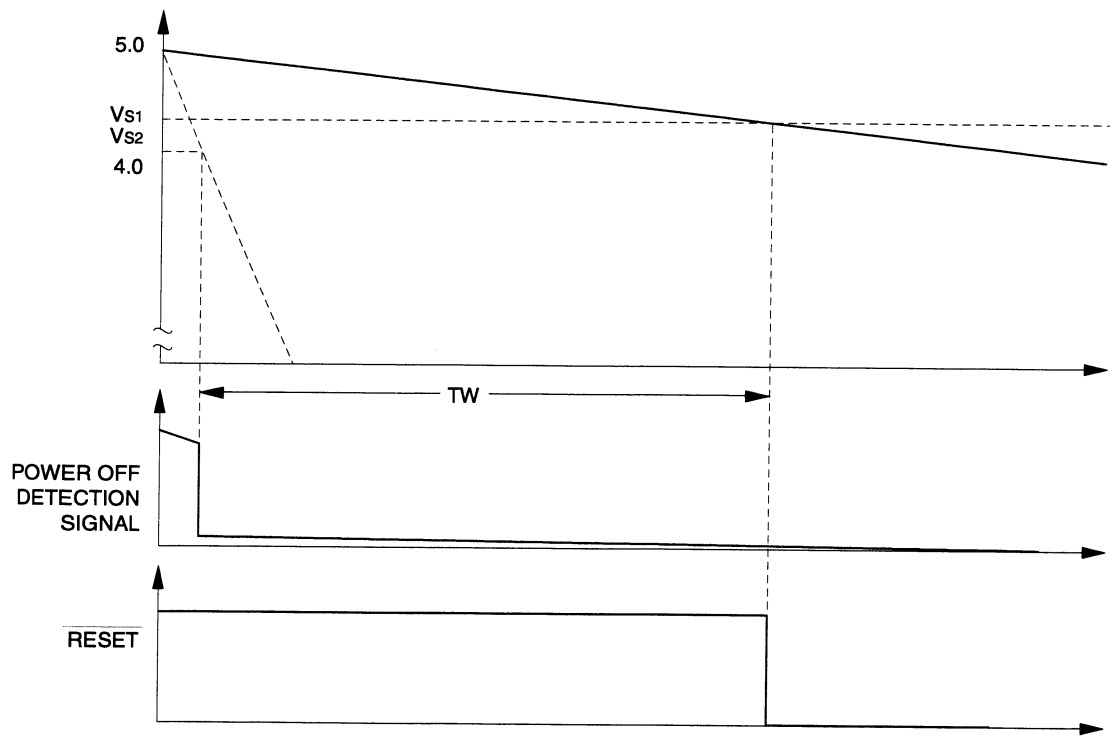

5.0
VS1
VS2
4.0
TW
POWER OFF
DETECTION
SIGNAL
RESET

Fig.12

7. MONITOR BUFFER CIRCUIT

Fig. 13 shows the monitor buffer circuit. This circuit functions only for the analog RGB signal. The analog RGB signal input from CN300 passes through the buffer amplifiers of IC302, IC303 and IC304, and is output from the output of the external monitor. Hsync, Vsync signal shape are modified by IC300 and IC301(COMPARATOR), and pass through SELECTOR(IC305). If MAC computer signal is inputted, only Hsync signal is sent to CN301 and Csyncsp signal is "L".

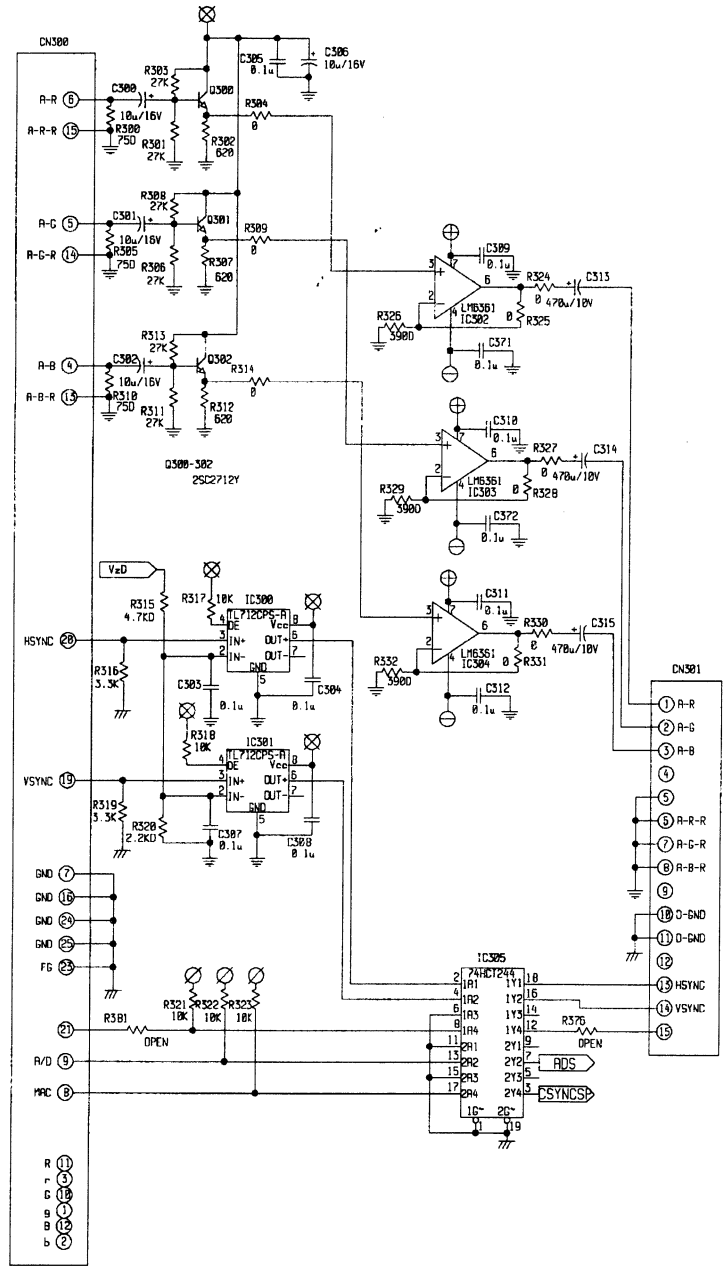


Fig. 13 Monitor Buffer Circuit

8. LCD CONTROL CIRCUIT

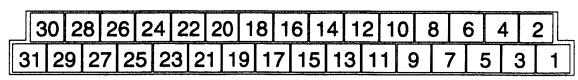
LCD control signal is slower than the video signal of the computer. While the video signal is serial data, LCD display data is given as 4-bit parallel data for each RGB. In order to display the bit signal of the computer in LCD, it is necessary to store the data of one screen in the memory and read out the image data of one screen at the drive timing of LCD. To control them, the field memory is controlled by the memory controller in IC100 as shown in the block diagram in Fig. 2.

9. LCD UNIT

9.1.Interface signals

Table 4 Pin assignment of LCD unit (CN1)

Pin	Code	Function
1	R0	RED data signal (LSB)
2	GND	
3	R1	RED data signal
4	Vsync	Vertically synchronous signal
5	R2	RED data signal
6	Hsync	Horizontally synchronous signal
7	R3	RED data signal (MSB)
8	GND	
9	GND	
10	CK	Sampling clock signal of data
11	G0	GREEN data signal (LSB)
12	GND	
13	G1	GREEN data signal
14	TST	Horizontal display direction reverse terminal
15	GND	
16	TST	Open
17	G2	GREEN data signal
18	TST	Open
19	G3	GREEN data signal (MSB)
20	GND	
21	GND	
22	Vcc	+5V power
23	B0	BLUE data signal (LSB)
24	Vcc	+5V power
25	B1	BLUE data signal
26	TST	Open
27	GND	
28	ENAB	Data enable signal (display position signal)
29	B2	BLUE data signal
30	GND	
31	B3	BLUE data signal (MSB)



CN1 Pin assignment

9.2.Sequence circuit of LCD panel

In QA-1400, it is necessary to conform the power ON/OFF sequence of the LCD panel as shown Fig.14.

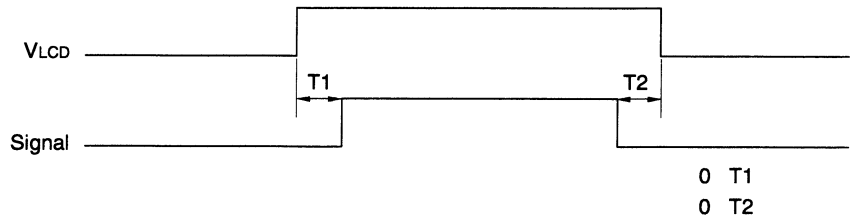


Fig. 14 Power ON/OFF sequence

Fig. 15 shows the panel sequence generation circuit.
The gate signal which has the same timing as the input signal in Fig. 14 is output by the RESET IC of IC4 and IC5.

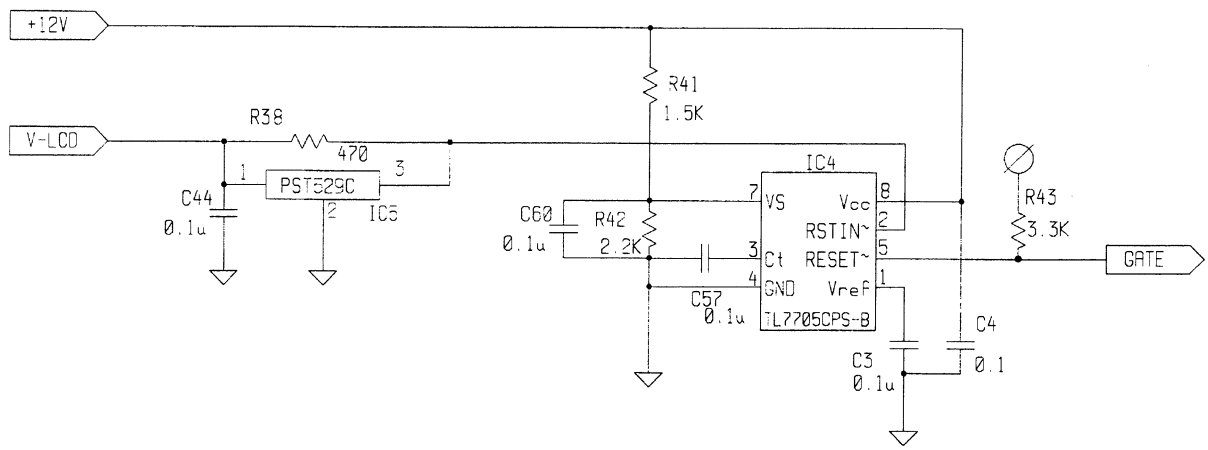


Fig. 15 Panel Sequence Generation Circuit

9.3.Handling the LCD panel

1. The LCD unit is assembled to very high density, do not attempt to disassemble it.
2. The polarizing plate is very easy to scratch, take extra care when handling it.
3. When cleaning the surface of the LCD panel, use absorbent cotton or soft cloth and carefully wipe the surface.
4. The LCD panel will become discolored or stained if any moisture remains on the surface for a long period of time.
5. The LCD panel is made of glass. If it is hit by any hard object or is dropped, it may crack.Handle it very carefully.
6. CMOS LSI which is used in the LCD unit is very sensitive to static electricity. To prevent damage to the LCD unit from static electricity it is necessary for all service technicians to use a conductive mat and wrist strap to ground themselves when servicing the unit.

10.POWER CIRCUIT

The AC adaptor which is connected to QA-1400 supplies stable power to the unit, and generates 5V power (VCC, Vcpu, V-LCD), VPP power, +10V power, -10V power and fan motor power (12V, 8V).

10.1. 5V power (V_{CC}, V_{CPU}, V_{LCD})

IC1 in Fig. 16 is a controller for a fixed frequency pulse width modulation(PWM) switching regulator and has two constant voltage controllers. One controller is used to generate a 5V power supply(V_{CPU},V_{CC}) from the input power supply VIN(12VDC). The other one is for V_{LCD}. IC1 has a saw-tooth wave oscillator built in whose oscillating frequency is determined by capacitor C30 connected to pin 1 and resister R29 connected to pin2. In this circuit configuration, a saw-tooth wave of approx.75KHz is observed at pin 1 of IC1. Basically this saw-tooth wave is compared with a control signal observed at pin5 of IC1. Only while the voltage of the saw-tooth wave is lower than the control signal voltage, the period between pin 7 of IC1 is "L" becomes longer. As a result the period between external transistor Q11 and Q10 is conductive becomes longer. The output voltage is fed back to pin 3 of IC1. An error amplifier in IC1 makes a comparison between the half of the reference voltage and the feed-back signal to pin 3 and generates a control signal(pin5 of IC1). As explained above the output voltage is stabilized by the pulse width from pin 7, which is generated by comparing the control signal with the saw-tooth wave.

V_{CPU} is adjusted to 5.1V while V_{CC} is 5V. This is done because the load on the V_{CC} is greater than the load on V_{CPU} and the forward voltages of D8, D9, and D10 are higher than that of D7.The voltage supplied to pin 6 of IC1 is called a dead time control signal. It controls the maximum ON period of the output transistor in IC1. The maximum ON period is realized on IC1 by shorting pin 6 and pin 16.

The saw-tooth wave oscillator of pin 1 of IC1 is used also for the control of this 5V power supply(V_{LCD}). The operation of the circuit is similar to that of the other 5V power supply(V_{CPU} and V_{CC}). The output voltage is fed back to pin 14 of IC1. The control signal is produced using a voltage generated by dividing the reference voltage inputted to pin 13 of IC1, and the feed back signal. The output voltage is stabilized by the pulse width from pin 10, which is genarated by comparing the control signal with the saw-tooth wave. V_{LCD} is adjusted to 5.0V with VR2.

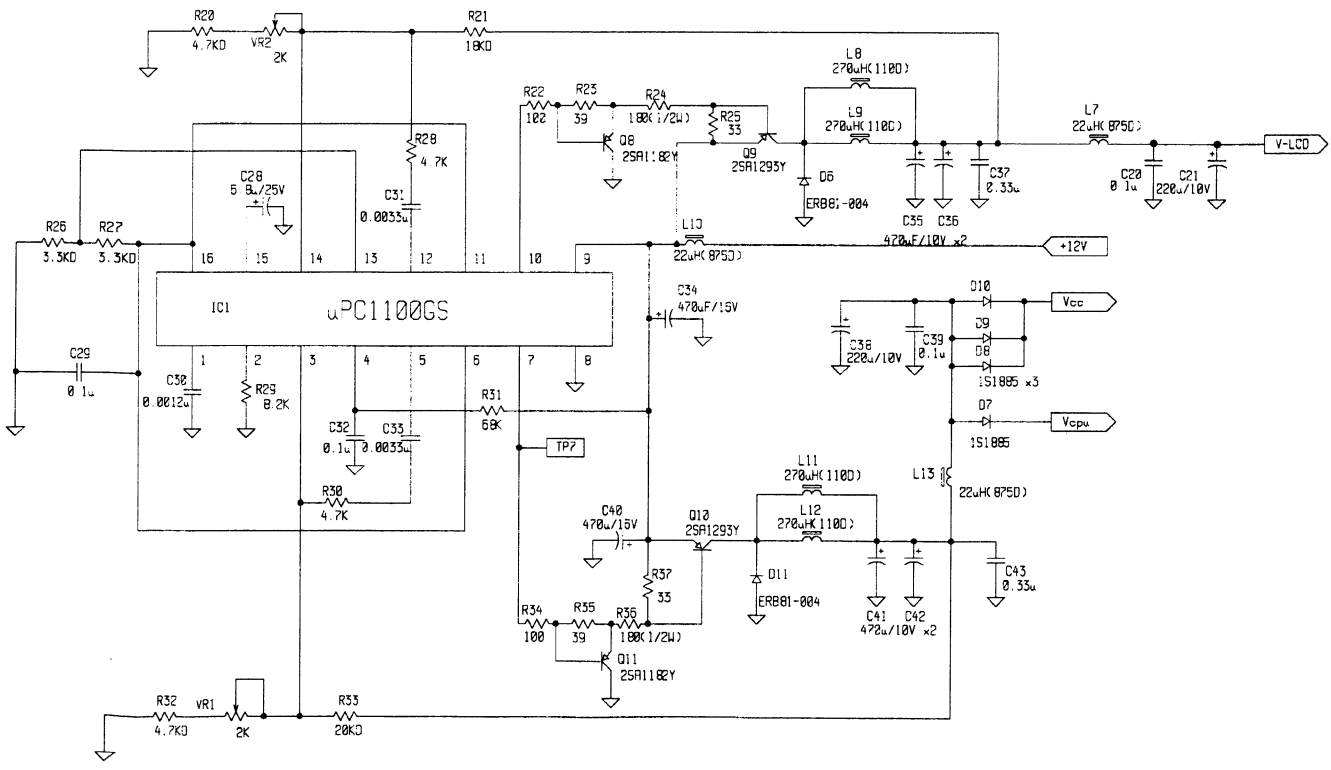


Fig. 16 5V Power(V_{CC},V_{CPU},V_{LCD}) Circuit

10.2.VPP power (12V)

Fig. 17 shows the VPP power supply circuit. The VPP power supply uses IC6 (DC/DC converter) to raise the voltage of V-LCD which is generated by IC1, and generates the voltage which is necessary to write and erase the memory unit.

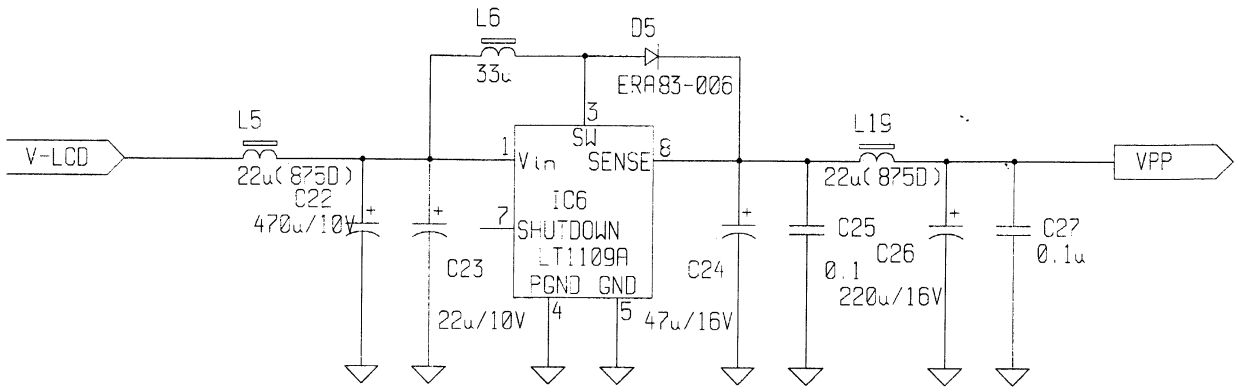


Fig. 17 VPP Power Circuit

10.3.+10V power

Fig. 18 shows the +10V power supply.

+10V is generated from the input power supply of 12V by the 3-terminal regulator of IC7.

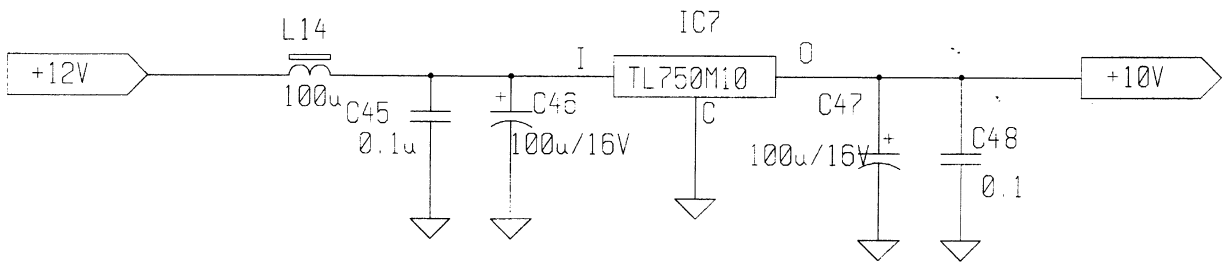


Fig.18 +10V Power Circuit

10.4.-10V power

Fig. 19 shows the -10V power circuit.

Using the switched capacitor voltage converter, IC8(LT1054) compares the output voltage with the reference voltage in the inner circuit of IC in order to continuously control the charge voltage of the capacitor voltage to be constant.

Thus, -10V is produced. The output voltage is set according to the partial voltage ratio of R39 and R40.

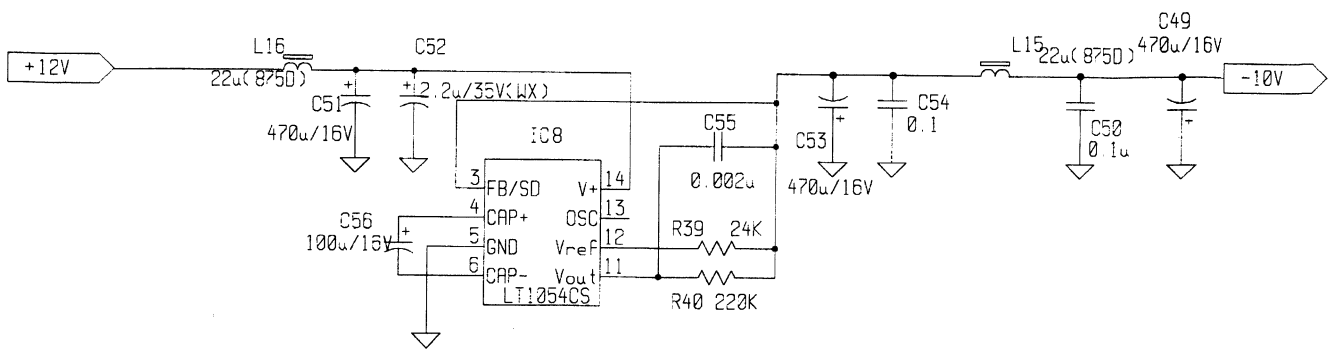


Fig.19 -10V Power Circuit

10.5. FAN 8V

Circuit diagram is shown in POWER CIRCUIT. FAN 8V generates the power from +12V line, using the DC-DC CONVERTER(IC2:FA7612N).
The feed-back voltage is inputted to pin 1 and compared with the reference voltage in IC2. The period of "H" is outputted from pin 4 becomes longer when the feed-back signal is lower than the reference voltage. As a result output voltage becomes higher. Output voltage is adjusted by VR3.SW2 becomes ON only when BACK LIGHT UNIT(QA-BL2) is attached to QA-1400. When SW2 is ON, Q3 is OFF, Q4 and Q6 is ON. As a result +8V is supplied to FAN MOTORs. On the contrary when SW2 is OFF, Q3 is ON, Q5 and Q7 is ON, as a result +12V is supplied. Thus only when QA-BL2 is attached, FAN MOTOR noise is reduced.
IC3 is voltage detection IC. Pin 4 becomes "H" after approx.0.7sec later from Vcc becomes 5V. This delay time is set by C13.

11. MOUSE

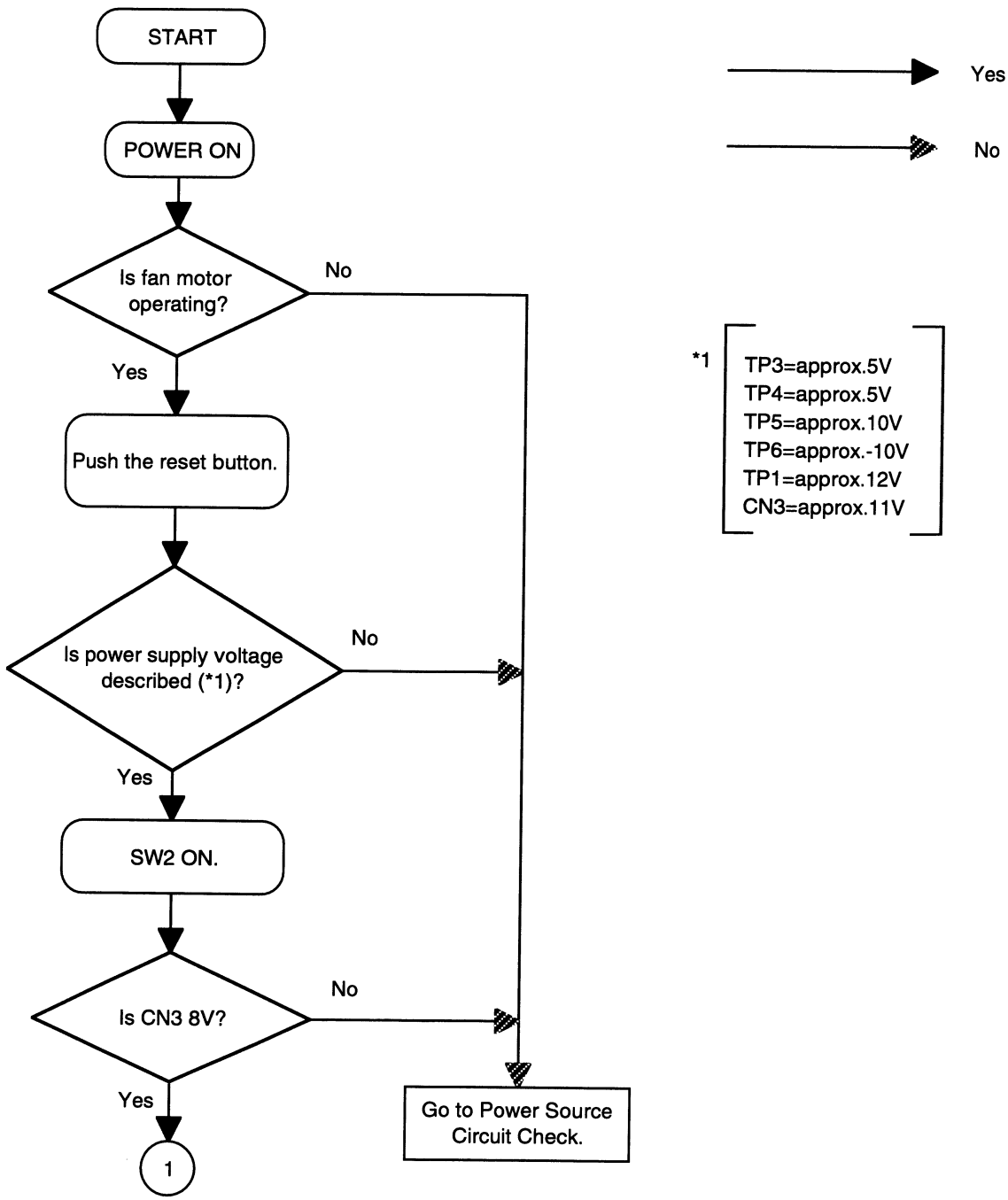
QA-1400 is provided with the mouse control circuit to make the communication possible for the mouse port of the main body of the computer. The mouse cursor displayed on the screen can be operated with the joystick on the accessory remote unit. They are controlled with MPU as shown in Fig. 2.

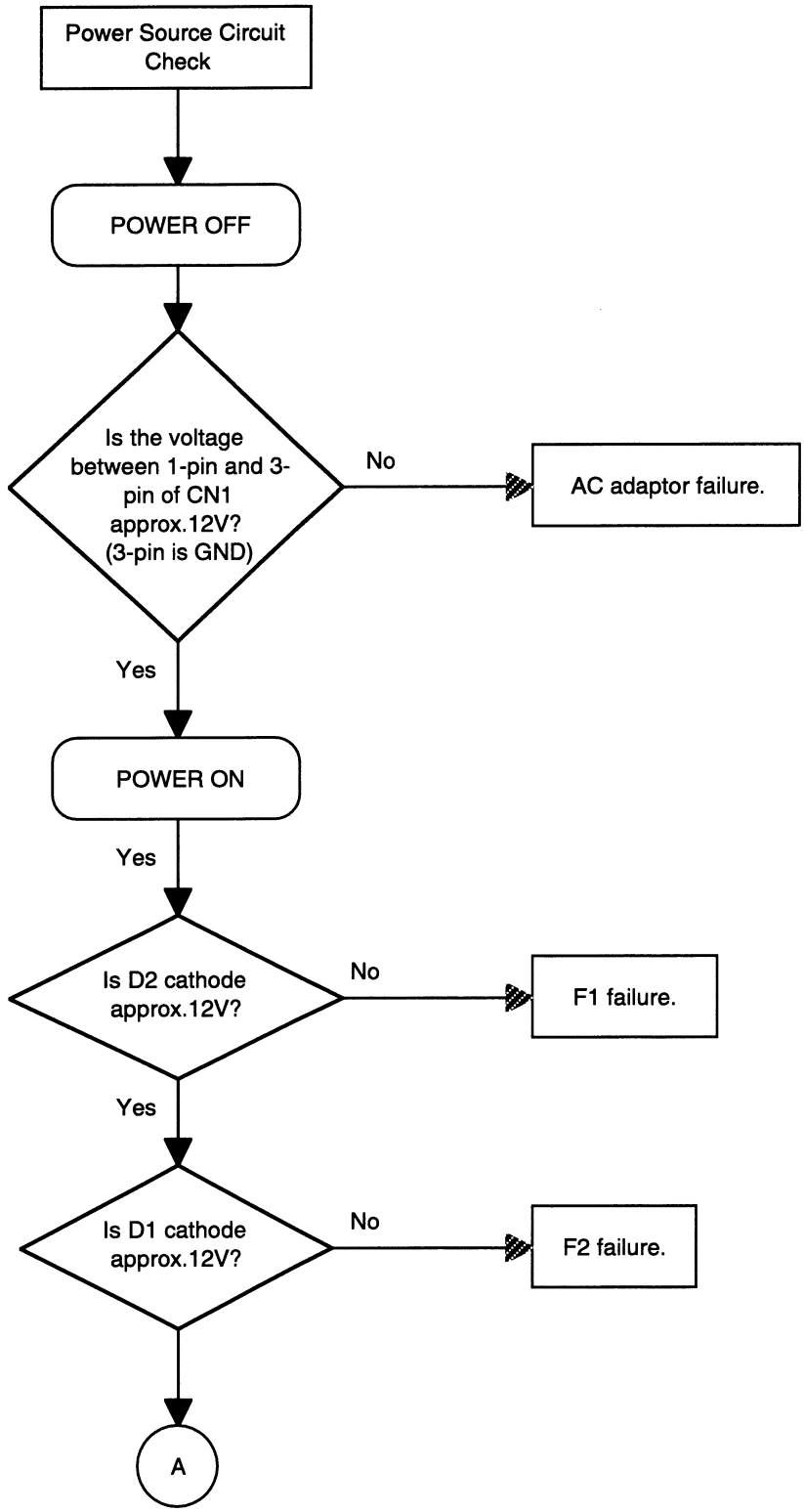
5. TROUBLESHOOTING CHART

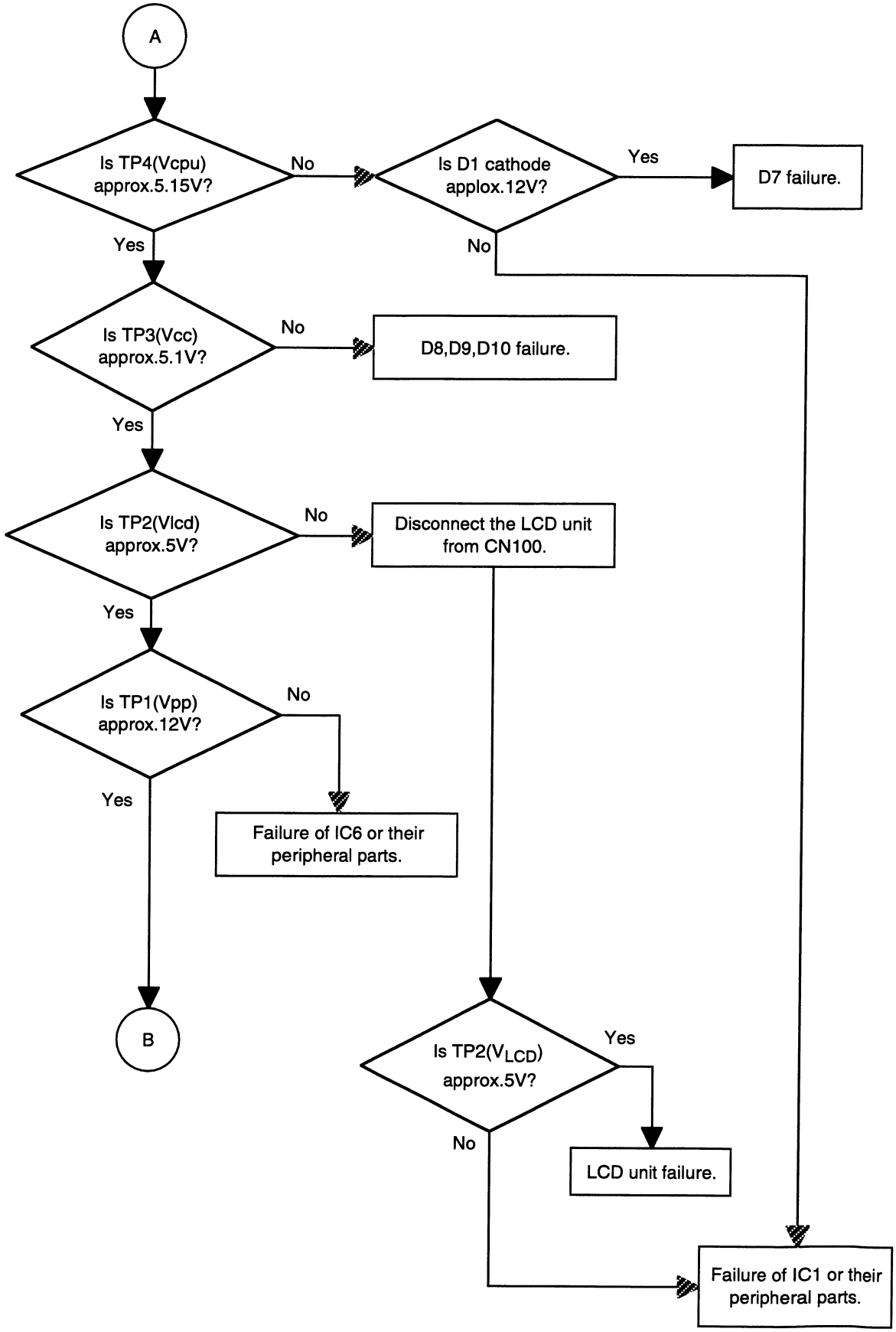
<Before starting the troubleshooting>

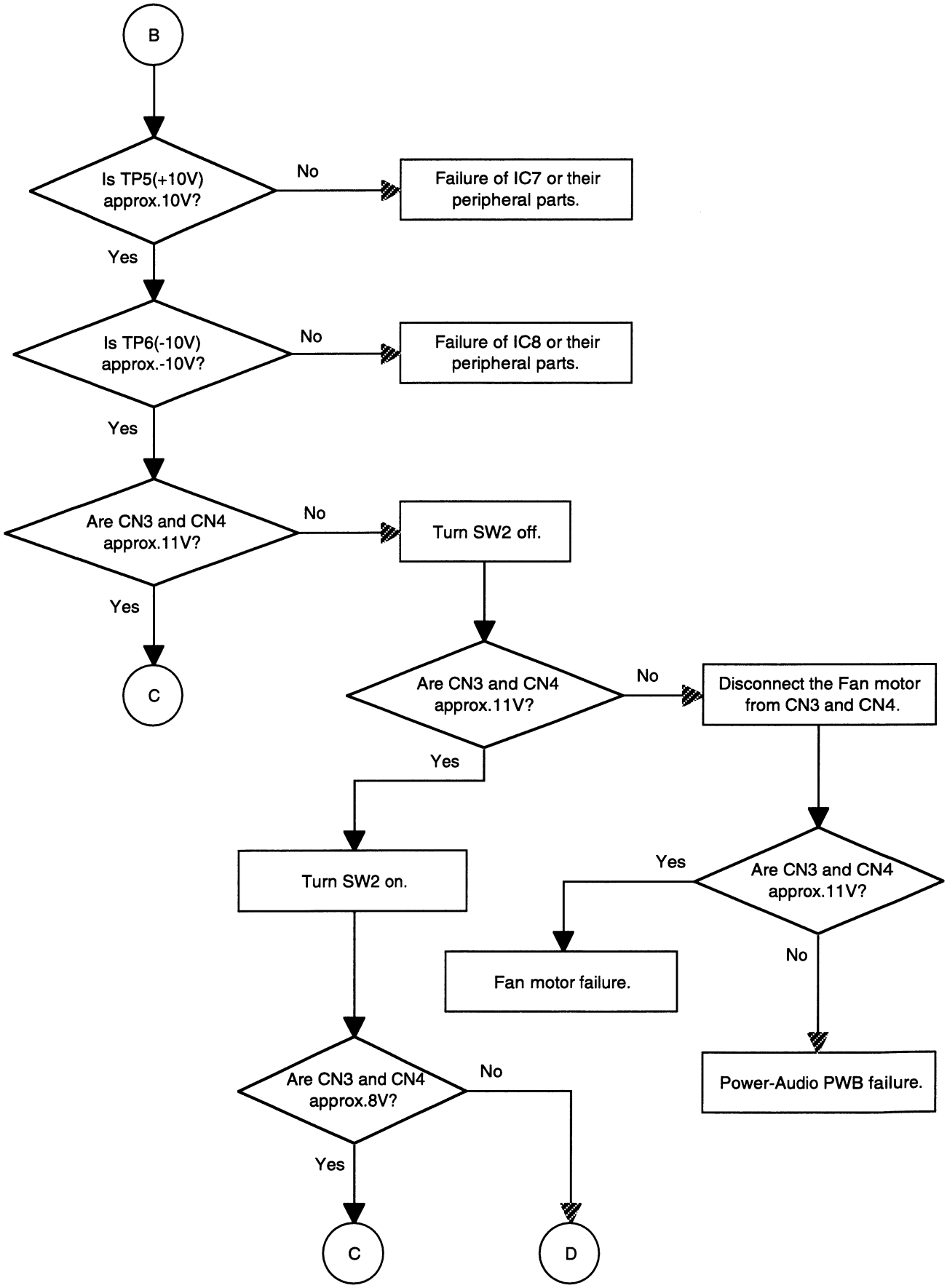
Please disassemble the QA-1400 according to the following method before checking.

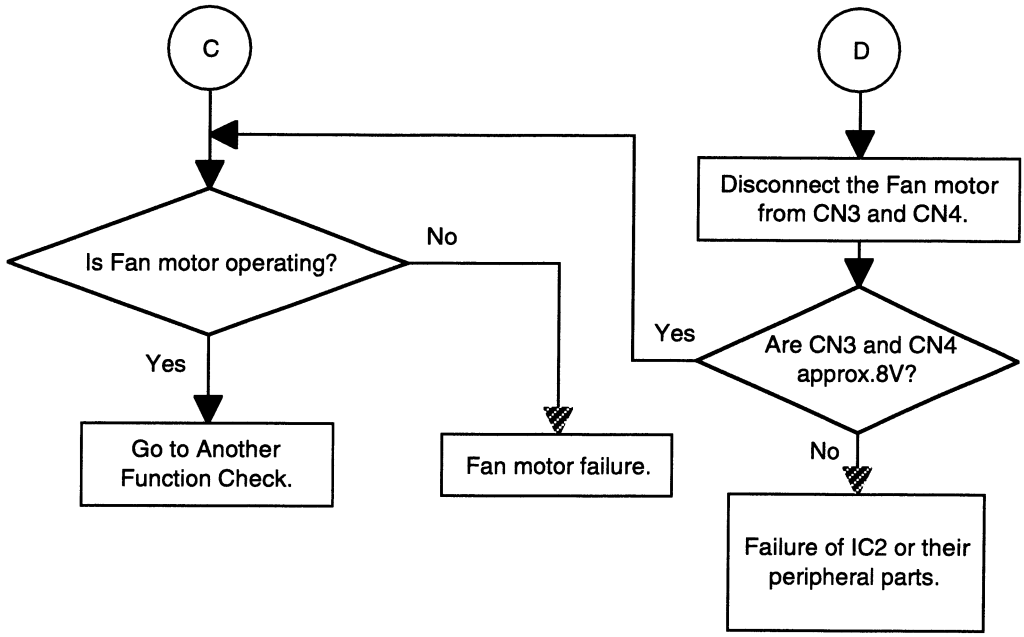
(1) Remove bottom cabinet screws(cabinet B).
(2) Separate the bottom cabinet(B) from top cabinet(A).
(3) Disconnect LED PWB connector from the Memory PWB.
(4) Remove the screws that secure the LCD panel to the metal angle. Disconnect the FPC cable from the LCD panel.
(5) Remove LCD metal angle screws and remove metal angle.
(6) Reconnect FPC cable to LCD panel.
(7) Reconnect LED PWB connector to Memory PWB.
(8) Remove the screws that secure the for the Memory PWB.
(9) If troubleshooting of the Memory PWB or points underneath the Memory PWB is required, a service connector is available. Please see Page.62 for part code number.

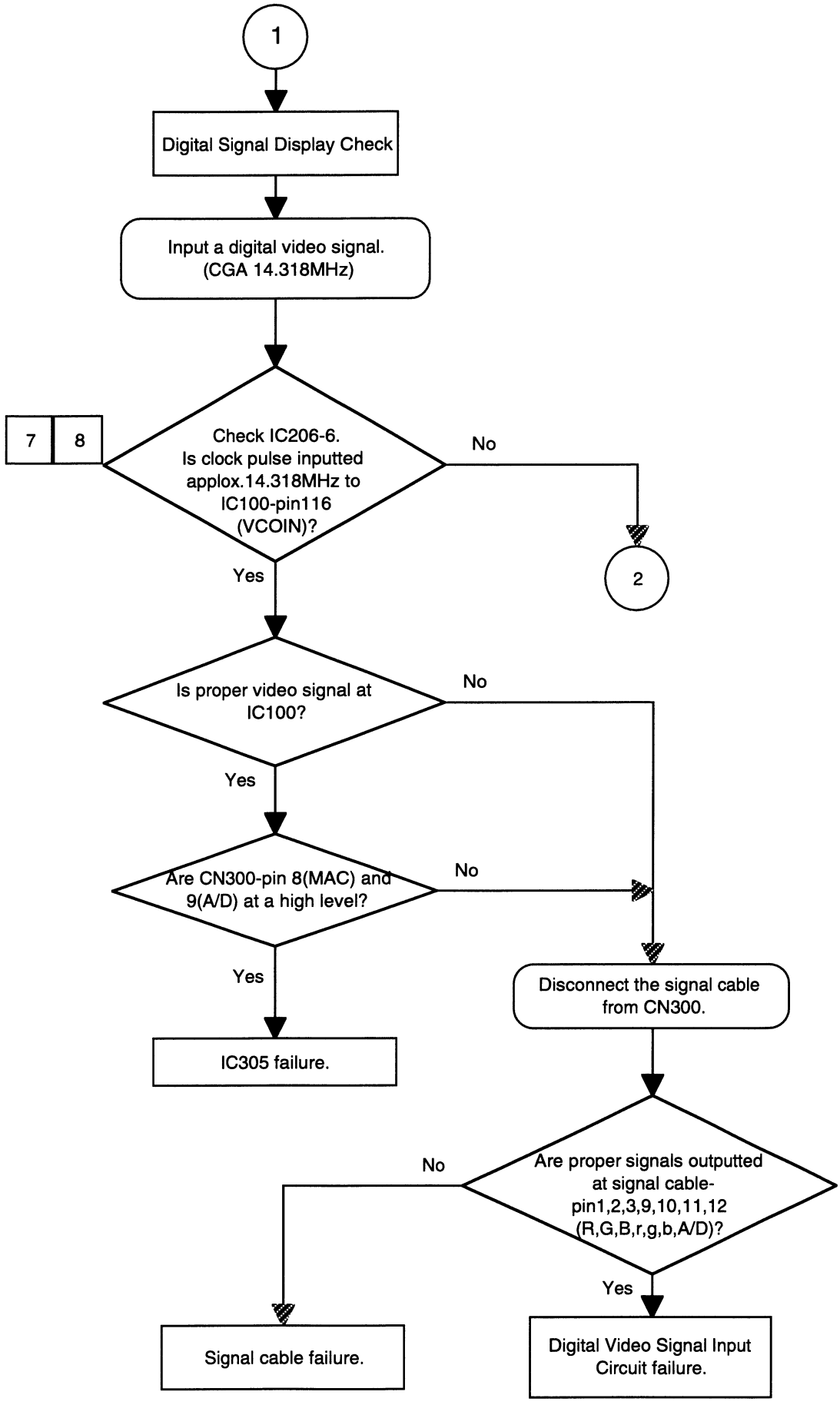


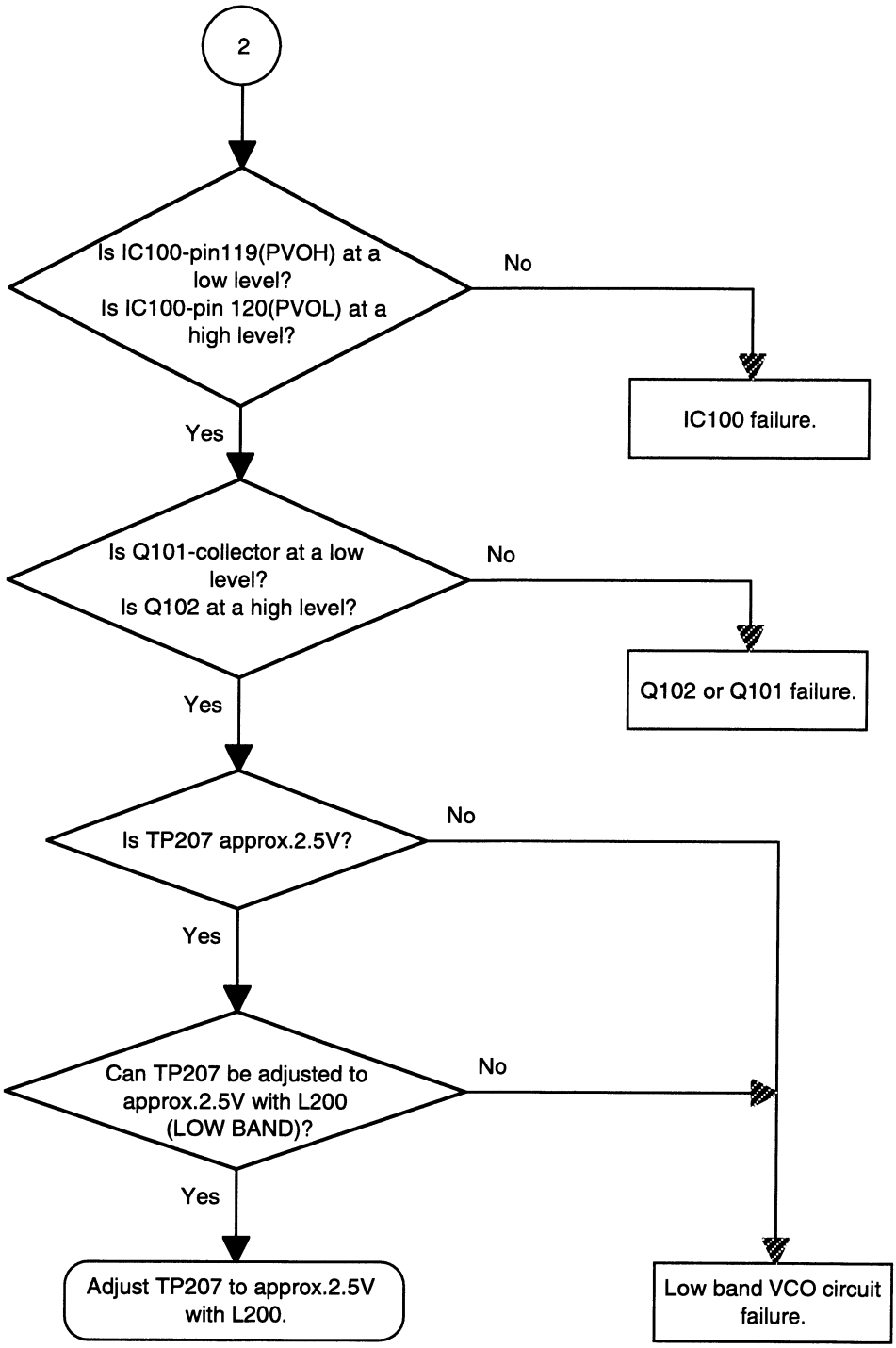

Power Source Circuit Check
POWER OFF
Is the voltage between 1-pin and 3-pin of CN1 approx.12V? (3-pin is GND)
No
AC adaptor failure.
Yes
POWER ON
Yes
Is D2 cathode approx.12V?
No
F1 failure.
Yes
Is D1 cathode approx.12V?
No
F2 failure.
A

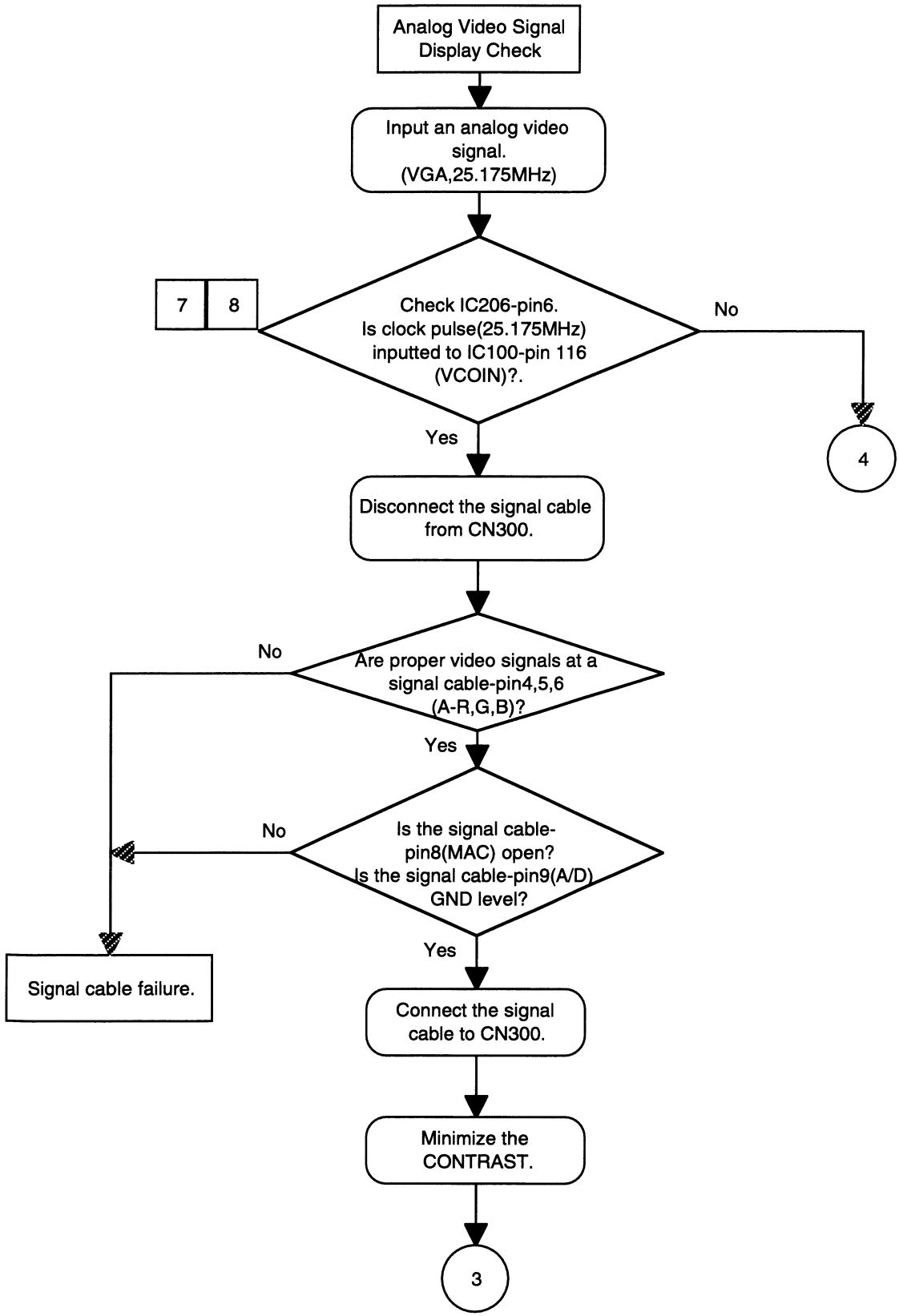

A
Is TP4(Vcpu) approx.5.15V?
No
Is D1 cathode applox.12V?
Yes
D7 failure.
Yes
No
Is TP3(Vcc) approx.5.1V?
No
D8,D9,D10 failure.
Yes
Is TP2(Vlcd) approx.5V?
No
Disconnect the LCD unit from CN100.
Yes
Is TP1(Vpp) approx.12V?
No
Failure of IC6 or their peripheral parts.
Yes
B
Is TP2(V_{LCD}) approx.5V?
Yes
No
LCD unit failure.
Failure of IC1 or their peripheral parts.

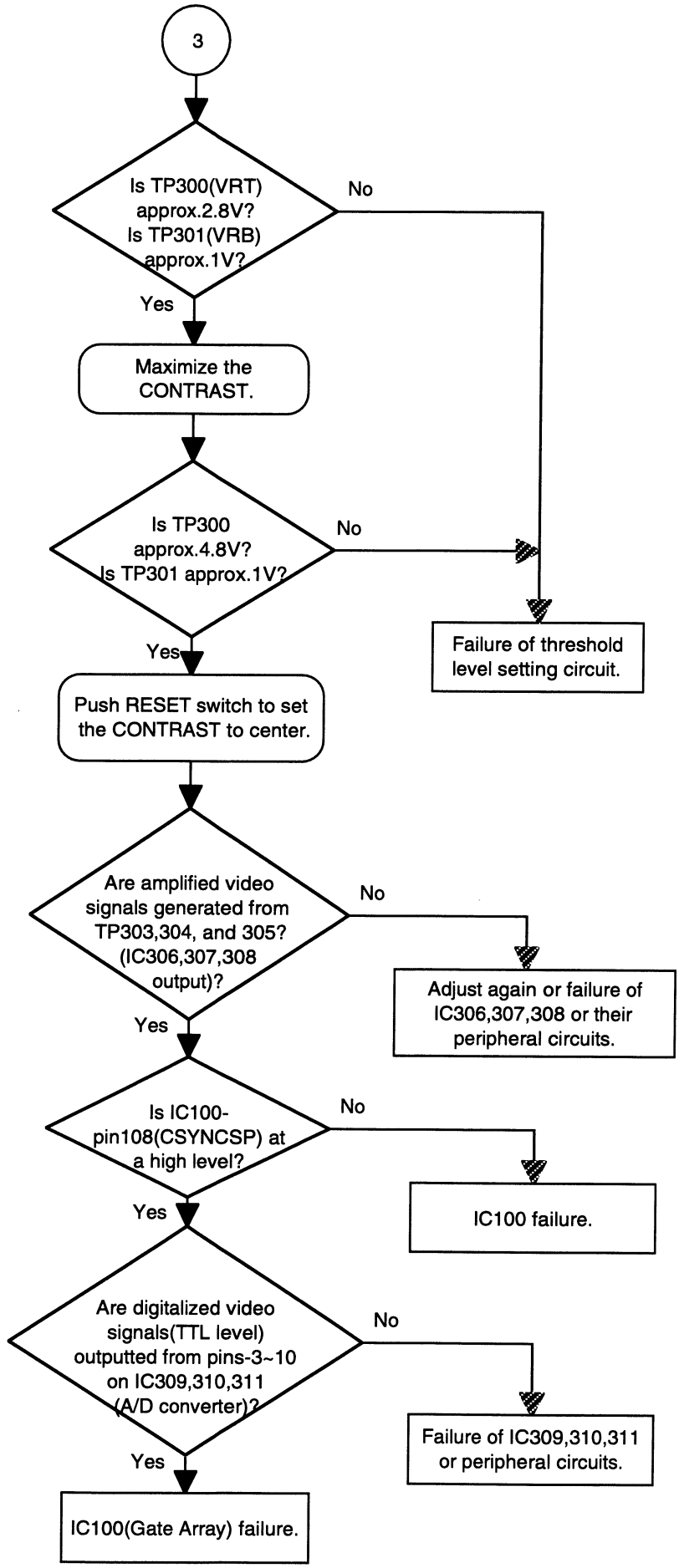

B
Is TP5(+10V) approx.10V?
No
Failure of IC7 or their peripheral parts.
Yes
Is TP6(-10V) approx.-10V?
No
Failure of IC8 or their peripheral parts.
Yes
Are CN3 and CN4 approx.11V?
No
Turn SW2 off.
Yes
C
Are CN3 and CN4 approx.11V?
No
Disconnect the Fan motor from CN3 and CN4.
Yes
Turn SW2 on.
Yes
Are CN3 and CN4 approx.11V?
Fan motor failure.
No
Power-Audio PWB failure.
Are CN3 and CN4 approx.8V?
No
Yes
C
D

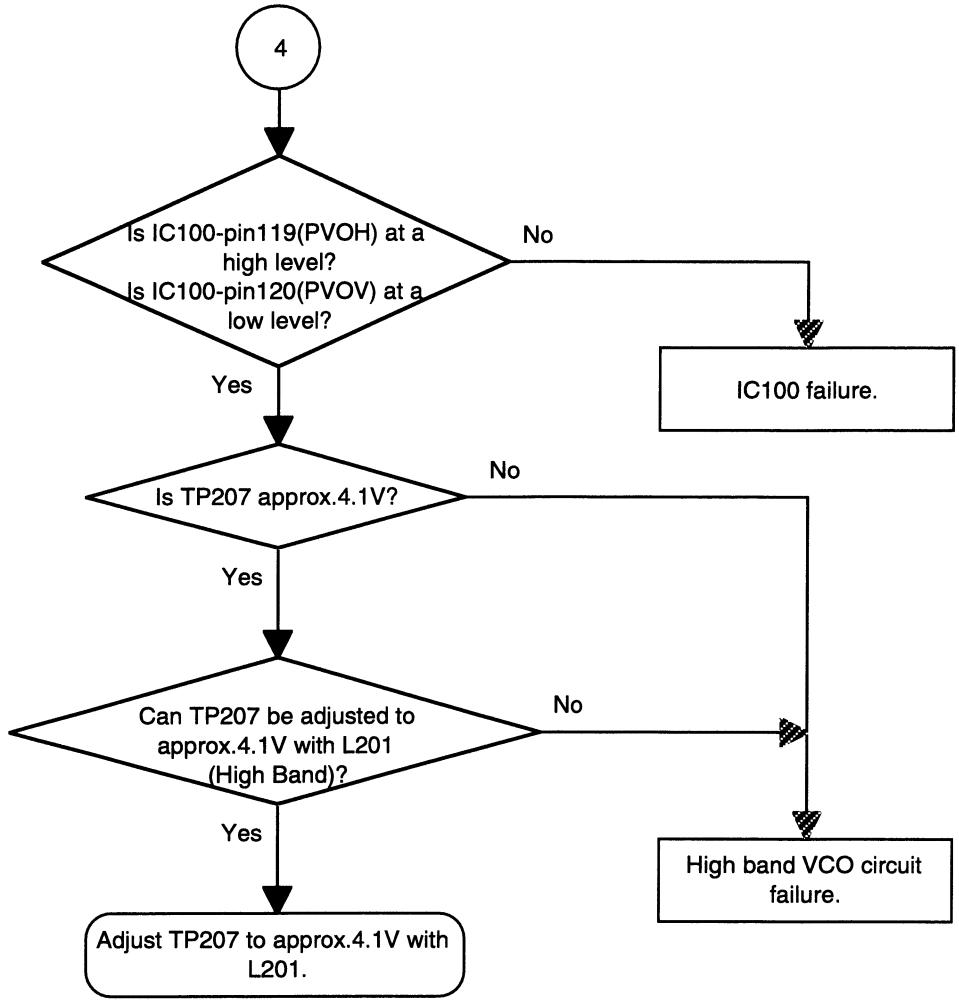

C
D
Disconnect the Fan motor from CN3 and CN4.
Is Fan motor operating?
No
Yes
Yes
Are CN3 and CN4 approx.8V?
No
Go to Another Function Check.
Fan motor failure.
Failure of IC2 or their peripheral parts.

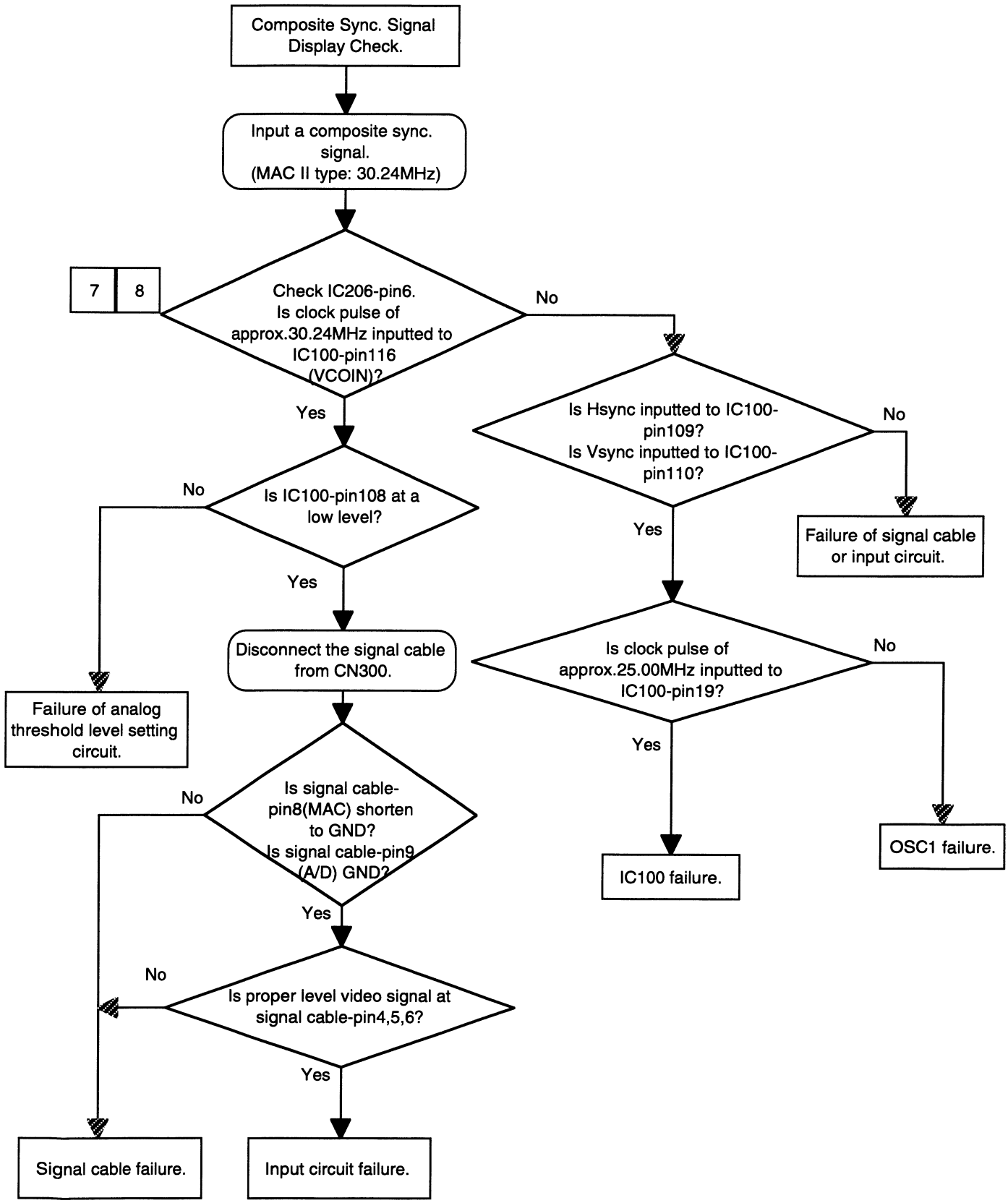

1
Digital Signal Display Check
Input a digital video signal.
(CGA 14.318MHz)
7
8
Check IC206-6.
Is clock pulse inputted
applox.14.318MHz to
IC100-pin116
(VCOIN)?
No
2
Yes
Is proper video signal at
IC100?
No
Yes
Are CN300-pin 8(MAC) and
9(A/D) at a high level?
No
Yes
IC305 failure.
Disconnect the signal cable
from CN300.
Are proper signals outputted
at signal cable-
pin1,2,3,9,10,11,12
(R,G,B,r,g,b,A/D)?
No
Yes
Signal cable failure.
Digital Video Signal Input
Circuit failure.

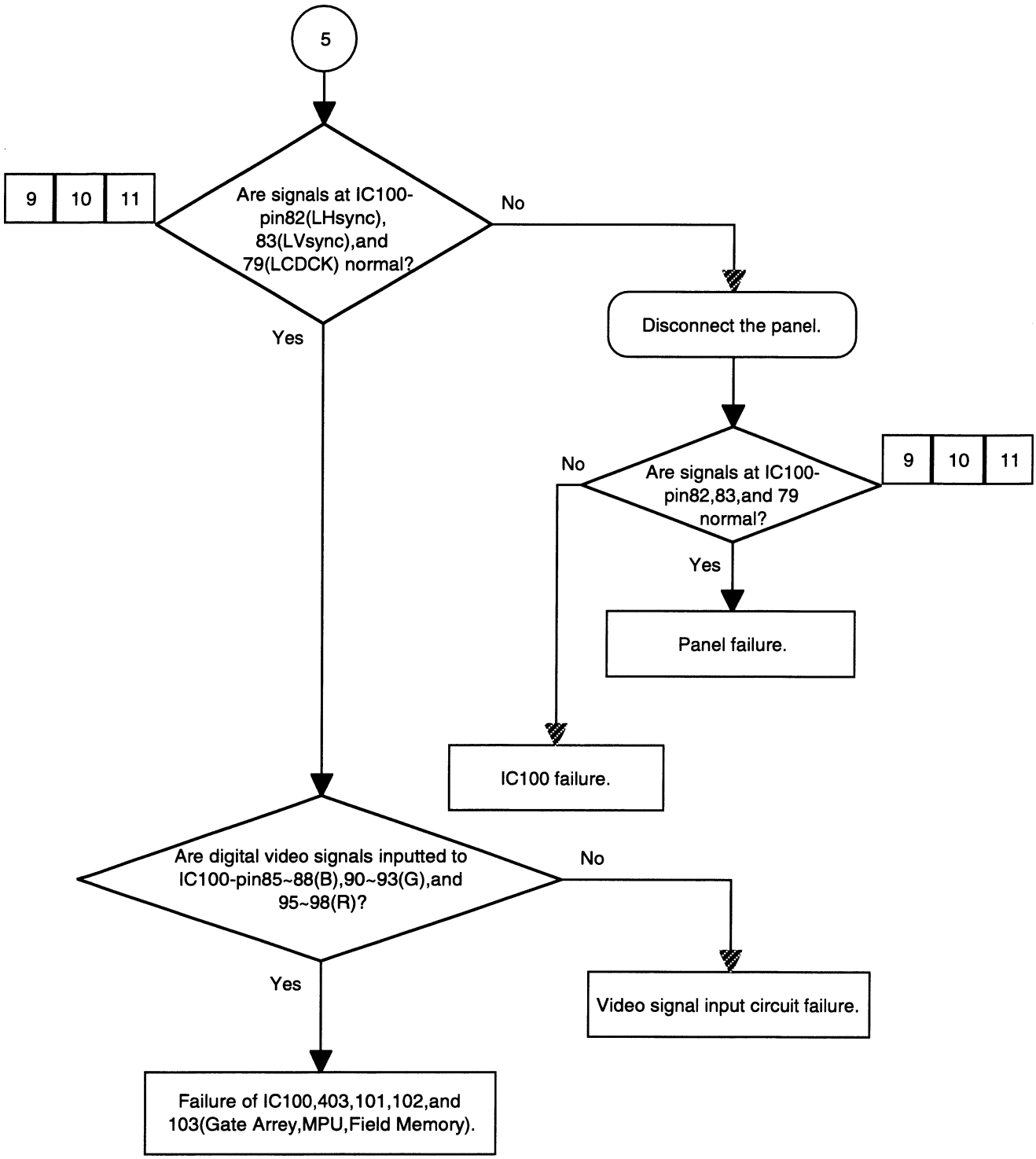

2
Is IC100-pin119(PVOH) at a low level?
Is IC100-pin 120(PVOL) at a high level?
No
IC100 failure.
Yes
Is Q101-collector at a low level?
Is Q102 at a high level?
No
Q102 or Q101 failure.
Yes
Is TP207 approx.2.5V?
No
Yes
Can TP207 be adjusted to approx.2.5V with L200 (LOW BAND)?
No
Yes
Adjust TP207 to approx.2.5V with L200.
Low band VCO circuit failure.

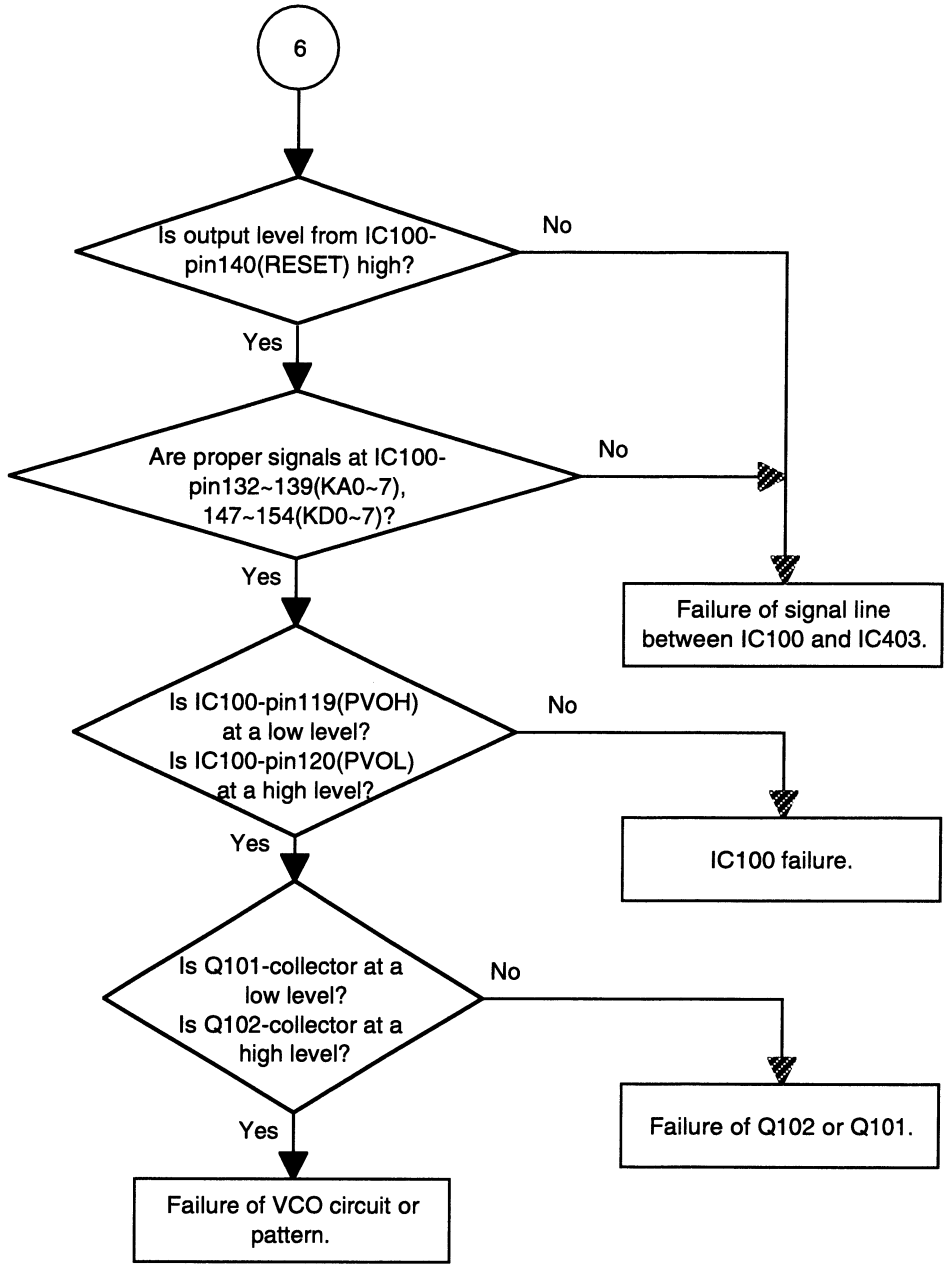

Analog Video Signal Display Check
Input an analog video signal. (VGA,25.175MHz)
7
8
Check IC206-pin6. Is clock pulse(25.175MHz) inputted to IC100-pin 116 (VCOIN)?.
No
4
Yes
Disconnect the signal cable from CN300.
No
Are proper video signals at a signal cable-pin4,5,6 (A-R,G,B)?
Yes
No
Is the signal cable-pin8(MAC) open? Is the signal cable-pin9(A/D) GND level?
Yes
Signal cable failure.
Connect the signal cable to CN300.
Minimize the CONTRAST.
3

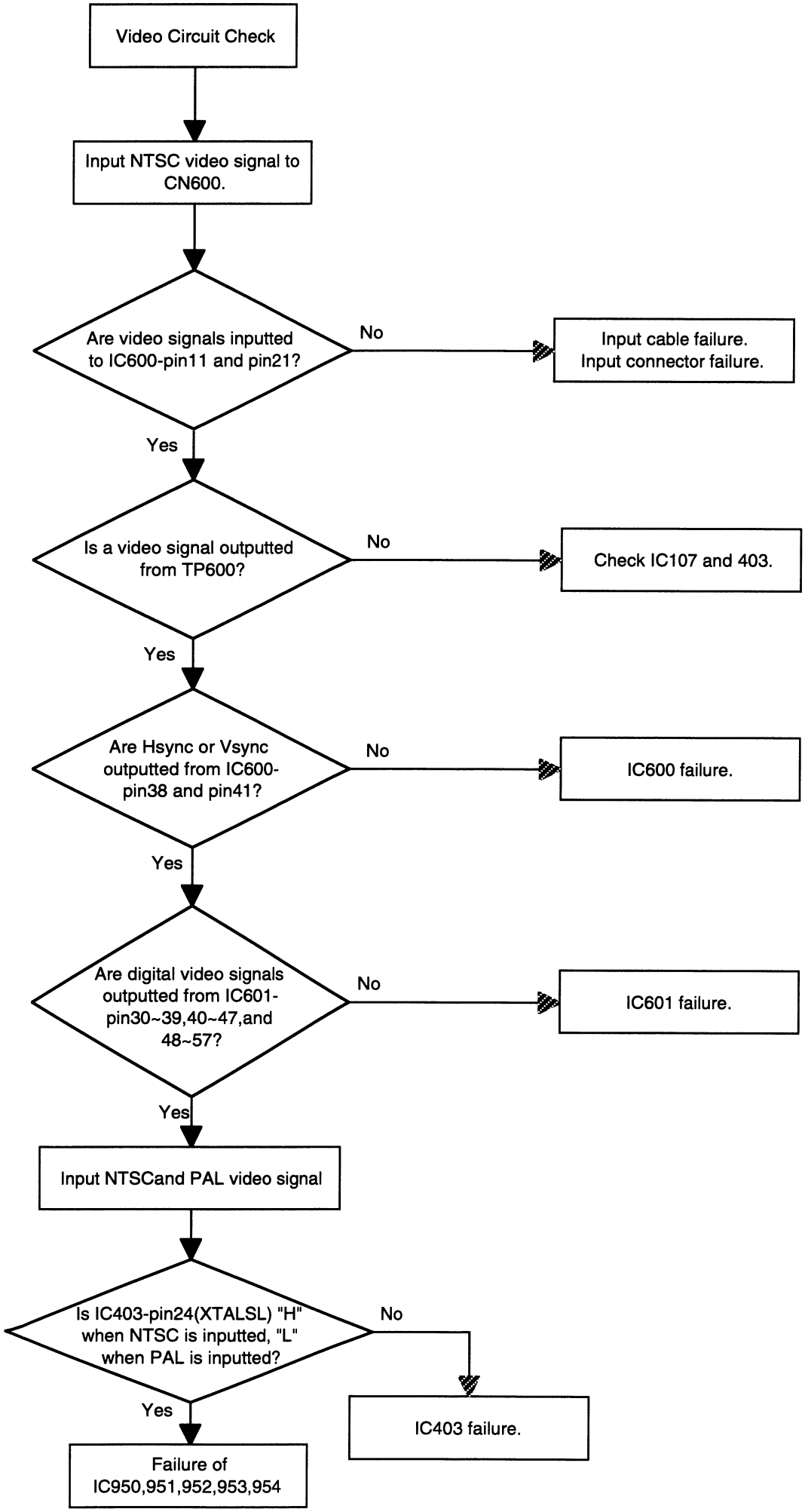

3
Is TP300(VRT) approx.2.8V? Is TP301(VRB) approx.1V?
No
Yes
Maximize the CONTRAST.
Is TP300 approx.4.8V? Is TP301 approx.1V?
No
Yes
Failure of threshold level setting circuit.
Push RESET switch to set the CONTRAST to center.
Are amplified video signals generated from TP303,304, and 305? (IC306,307,308 output)?
No
Yes
Adjust again or failure of IC306,307,308 or their peripheral circuits.
Is IC100-pin108(CSYNCSP) at a high level?
No
Yes
IC100 failure.
Are digitalized video signals(TTL level) outputted from pins-3~10 on IC309,310,311 (A/D converter)?
No
Yes
Failure of IC309,310,311 or peripheral circuits.
IC100(Gate Array) failure.


4
Is IC100-pin119(PVOH) at a high level?
Is IC100-pin120(PVOV) at a low level?
No
IC100 failure.
Yes
Is TP207 approx.4.1V?
No
Yes
Can TP207 be adjusted to approx.4.1V with L201 (High Band)?
No
High band VCO circuit failure.
Yes
Adjust TP207 to approx.4.1V with L201.


Composite Sync. Signal Display Check.
Input a composite sync. signal. (MAC II type: 30.24MHz)
7
8
Check IC206-pin6. Is clock pulse of approx.30.24MHz inputted to IC100-pin116 (VCOIN)?
No
Yes
Is Hsync inputted to IC100-pin109? Is Vsync inputted to IC100-pin110?
No
Failure of signal cable or input circuit.
Yes
No
Is IC100-pin108 at a low level?
Yes
Failure of analog threshold level setting circuit.
Disconnect the signal cable from CN300.
Is clock pulse of approx.25.00MHz inputted to IC100-pin19?
No
Yes
OSC1 failure.
IC100 failure.
No
Is signal cable-pin8(MAC) shorten to GND? Is signal cable-pin9 (A/D) GND?
Yes
No
Is proper level video signal at signal cable-pin4,5,6?
Yes
Signal cable failure.
Input circuit failure.


5
9
10
11
Are signals at IC100-pin82(LHsync), 83(LVsync),and 79(LCDCK) normal?
No
Yes
Disconnect the panel.
No
Are signals at IC100-pin82,83,and 79 normal?
9
10
11
Yes
Panel failure.
IC100 failure.
Are digital video signals inputted to IC100-pin85~88(B),90~93(G),and 95~98(R)?
No
Yes
Video signal input circuit failure.
Failure of IC100,403,101,102,and 103(Gate Arrey,MPU,Field Memory).


6
Is output level from IC100-pin140(RESET) high?
No
Yes
Are proper signals at IC100-pin132~139(KA0~7), 147~154(KD0~7)?
No
Yes
Failure of signal line between IC100 and IC403.
Is IC100-pin119(PVOH) at a low level? Is IC100-pin120(PVOL) at a high level?
No
Yes
IC100 failure.
Is Q101-collector at a low level? Is Q102-collector at a high level?
No
Yes
Failure of Q102 or Q101.
Failure of VCO circuit or pattern.


Video Circuit Check
Input NTSC video signal to CN600.
Are video signals inputted to IC600-pin11 and pin21?
No
Input cable failure. Input connector failure.
Yes
Is a video signal outputted from TP600?
No
Check IC107 and 403.
Yes
Are Hsync or Vsync outputted from IC600-pin38 and pin41?
No
IC600 failure.
Yes
Are digital video signals outputted from IC601-pin30~39,40~47,and 48~57?
No
IC601 failure.
Yes
Input NTSCand PAL video signal
Is IC403-pin24(XTALSL) "H" when NTSC is inputted, "L" when PAL is inputted?
No
IC403 failure.
Yes
Failure of IC950,951,952,953,954

[1] IC403-2
1V/div
50ns/div

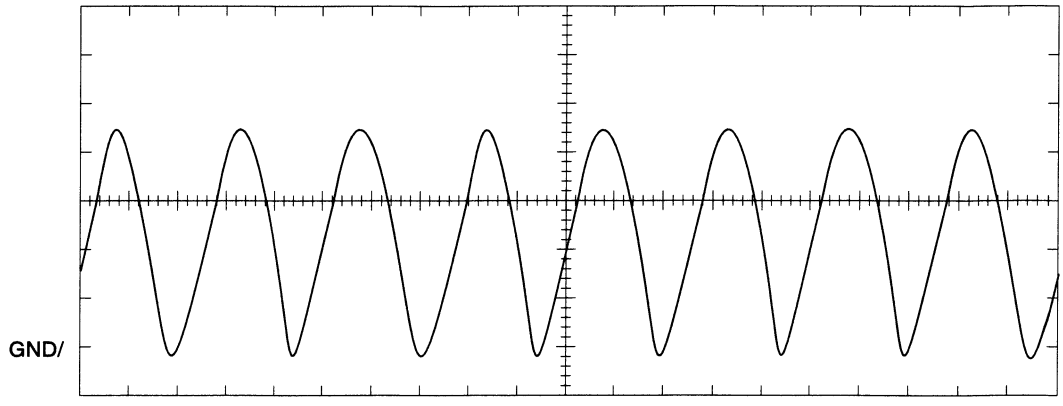


Fig.20

[2] Vcpu...2V/div
IC403-7...2V/div
5ms/div

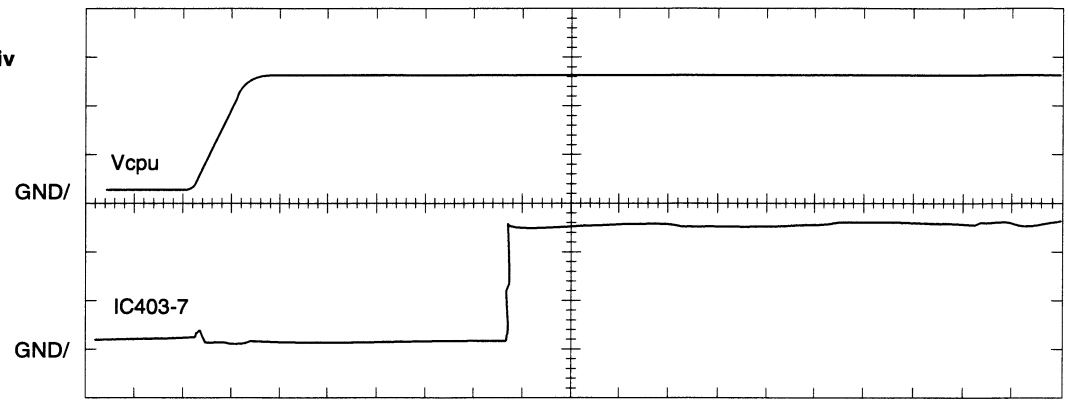


Fig.21

[3] Vc...2V/div
IC403-5,64
2V/div
10ms/div

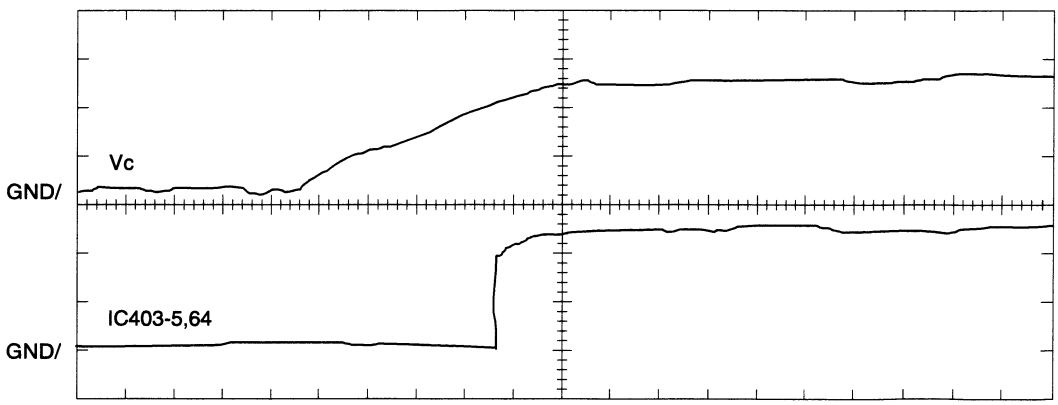


Fig.22

[4] IC403-15...1V/div
50ns/div

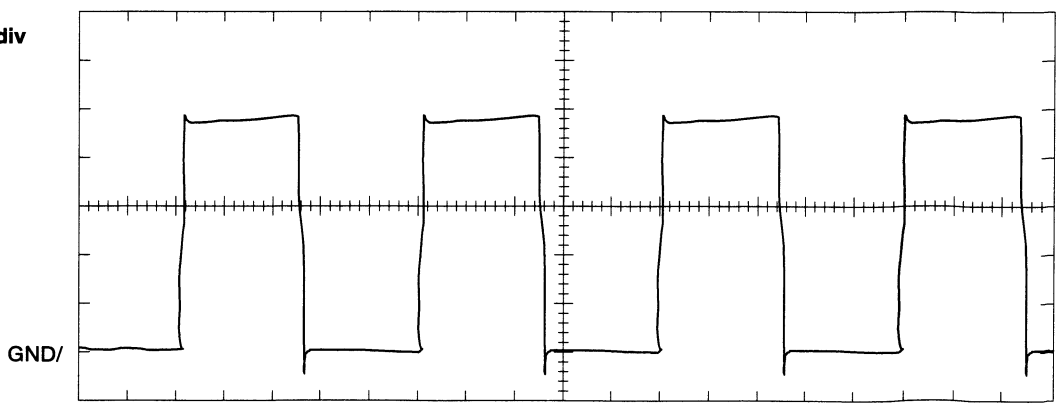


Fig.23

5 **IC100-19**
1V/div
10ns/div

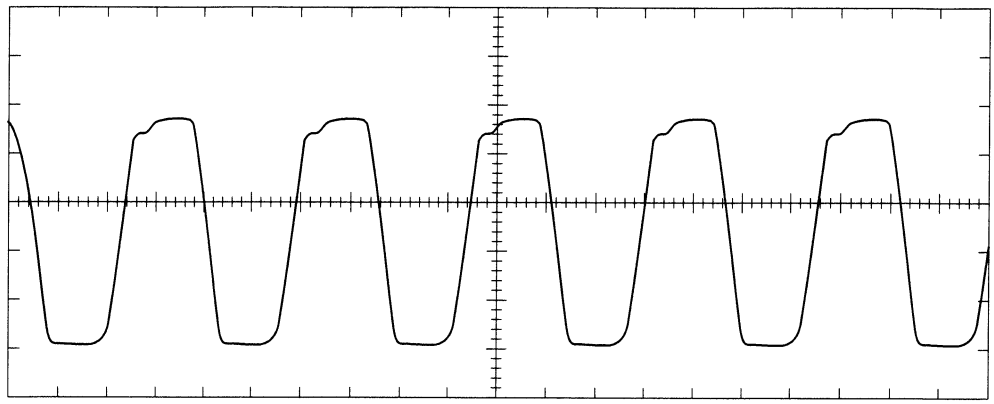


Fig.24

6 **IC100-110...2V/div**
500ns/div

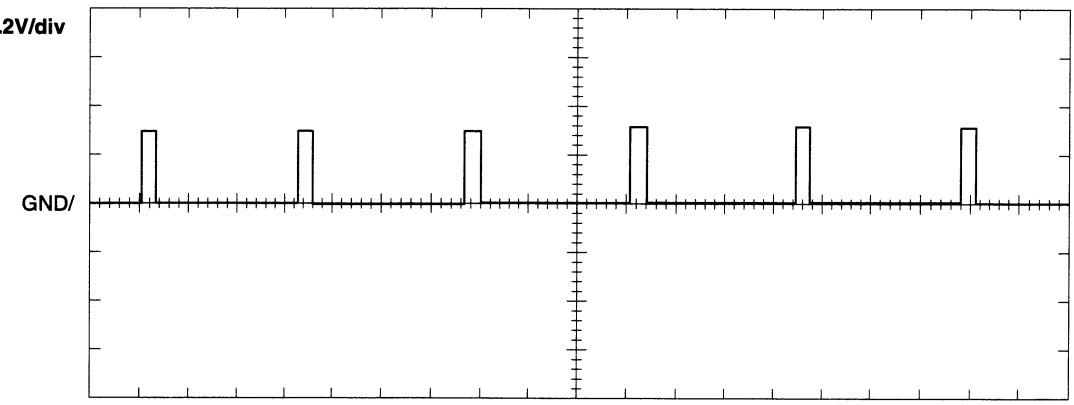


Fig.25

7 **IC100-110...2V/div**
IC206-6...2V/div
50ns/div

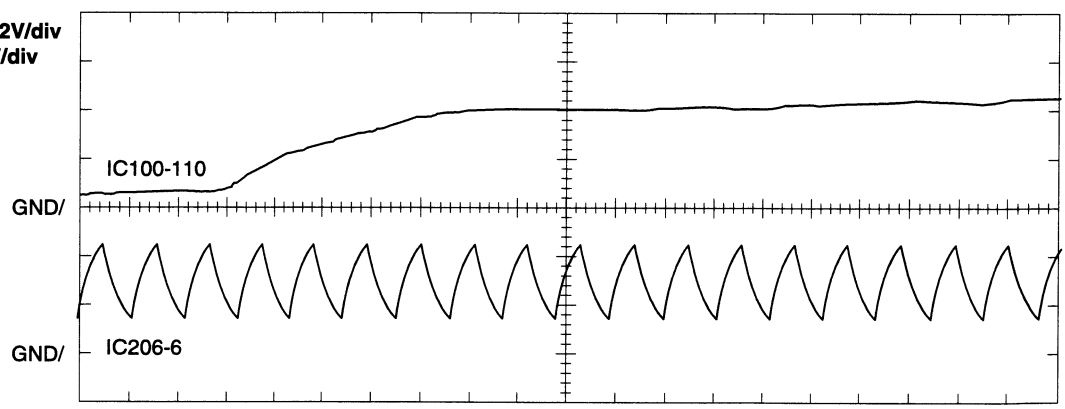


Fig.26

8 **IC100-109...2V/div**
IC206-6...2V/div
20ns/div

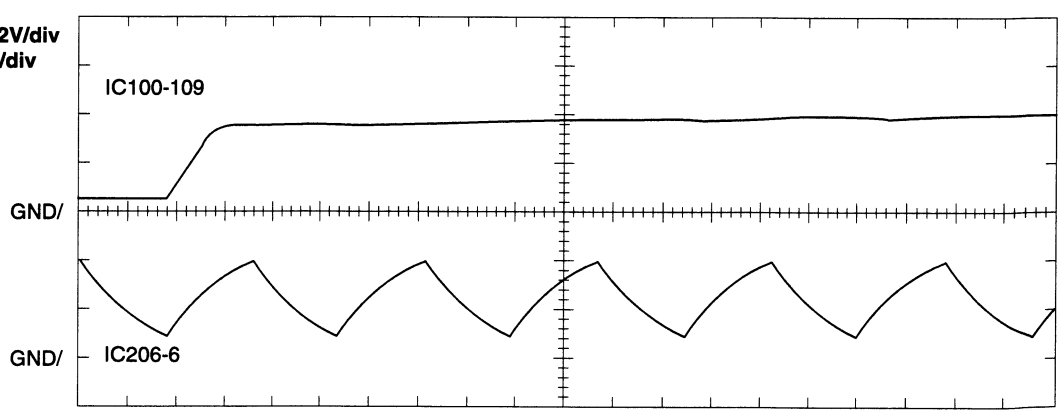


Fig.27

9 IC100-79
1V/div
10ns/div

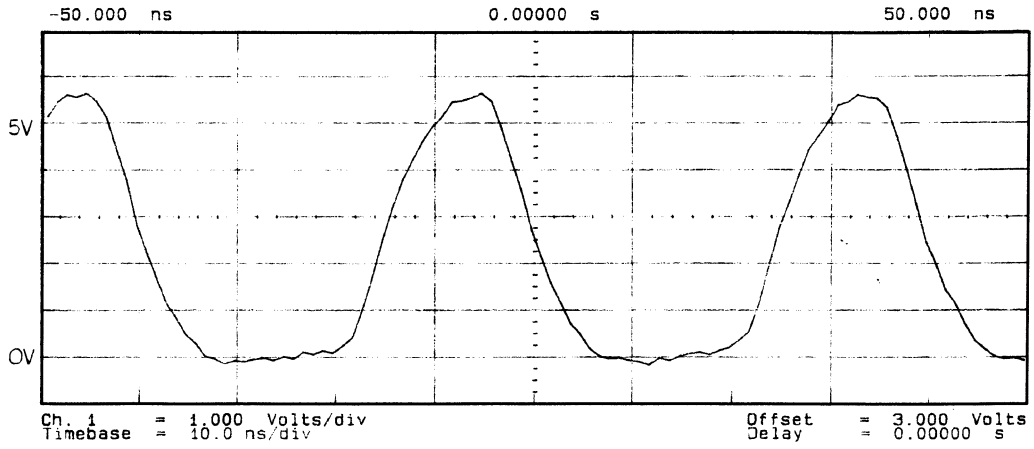


Fig.28

10 IC100-82
1V/div
10ns/div

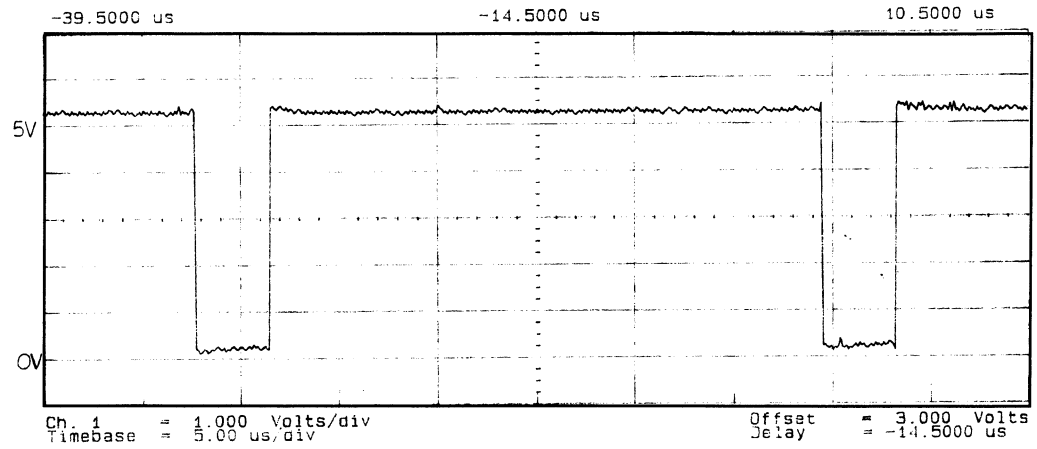


Fig.29

11 IC100-83
1V/div
10ns/div

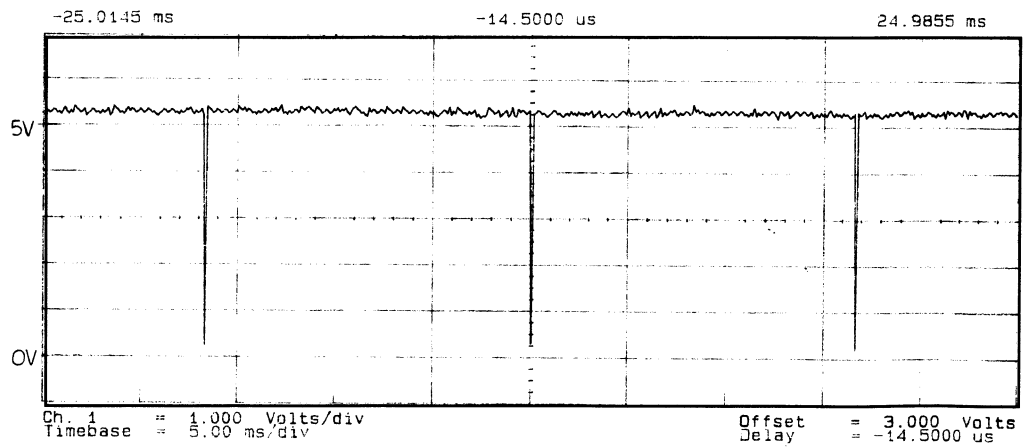


Fig.30

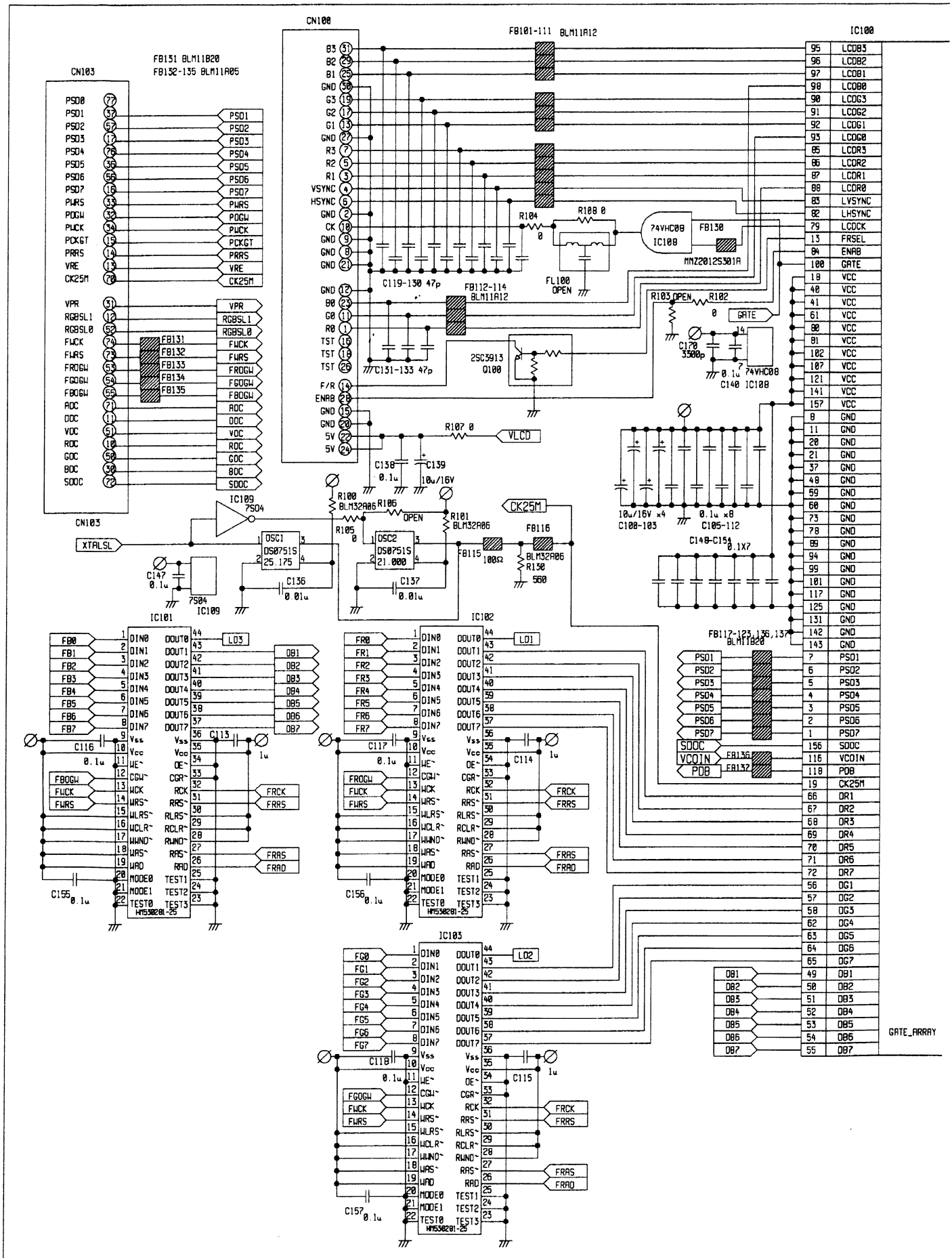


Fig.31 CIRCUIT DIAGRAM(MAIN CIRCUIT No.1)

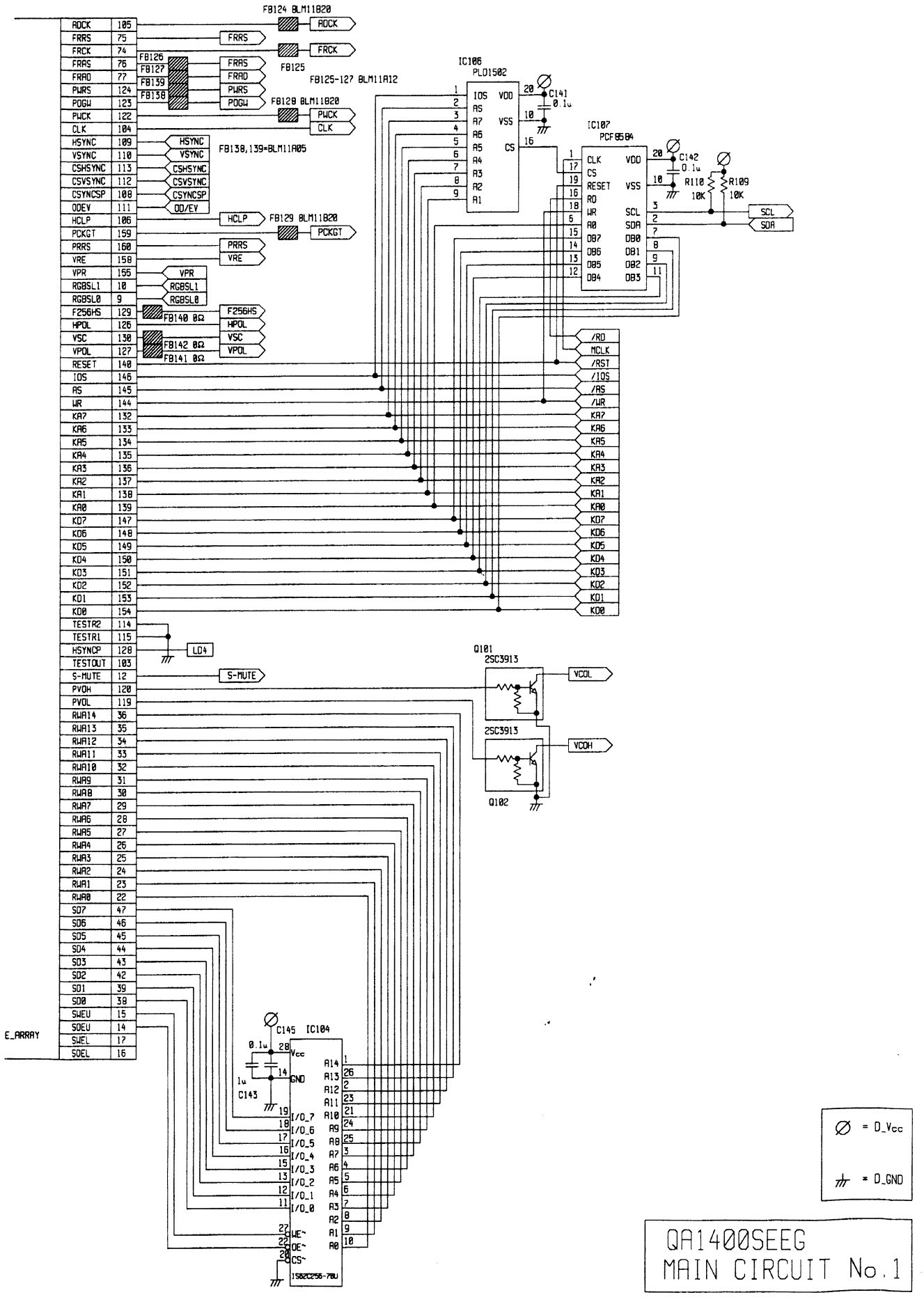


Fig.31 CIRCUIT DIAGRAM(MAIN CIRCUIT No.1)

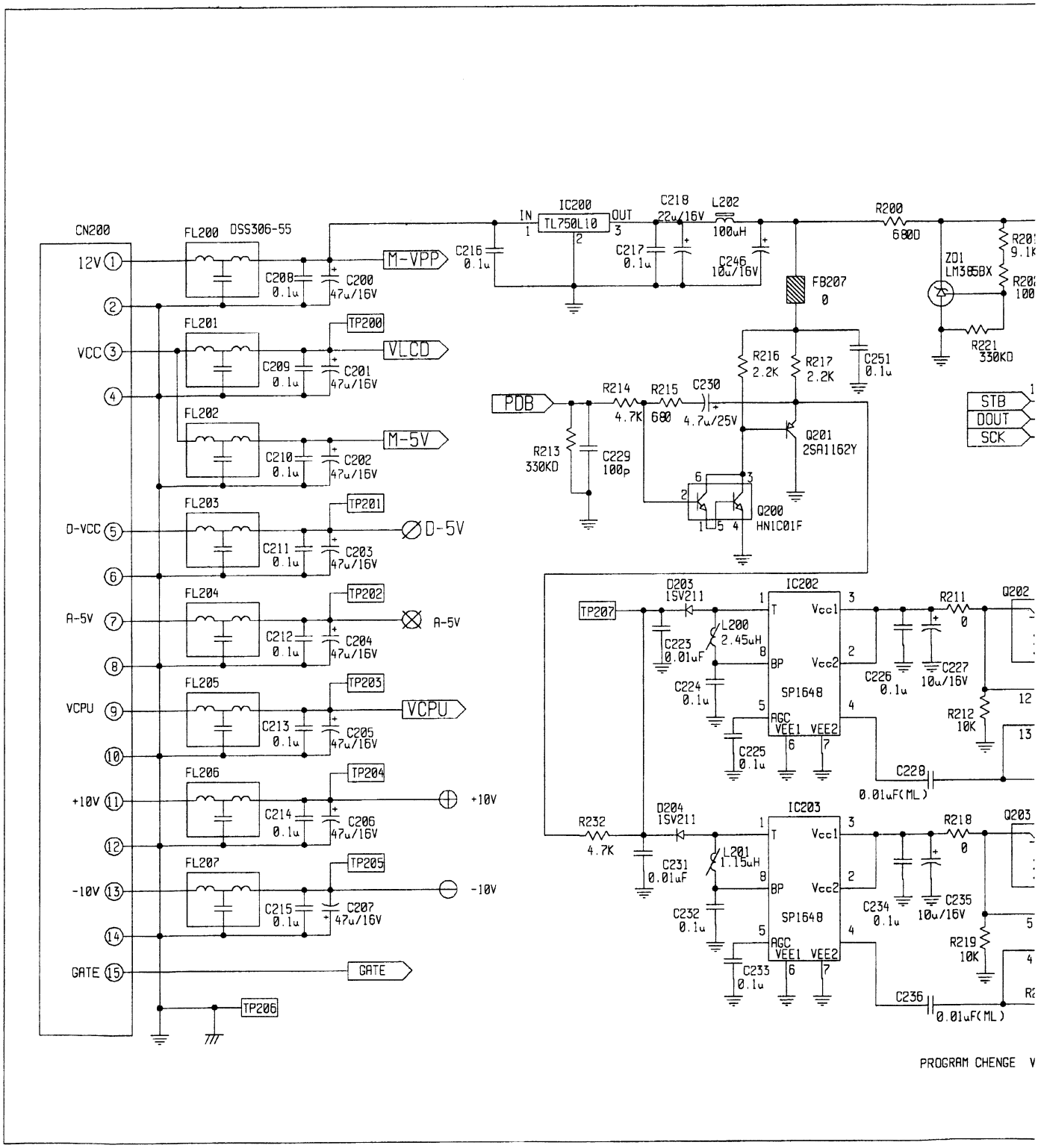


Fig.32 CIRCUIT DIAGRAM(MAIN CIRCUIT No.2)

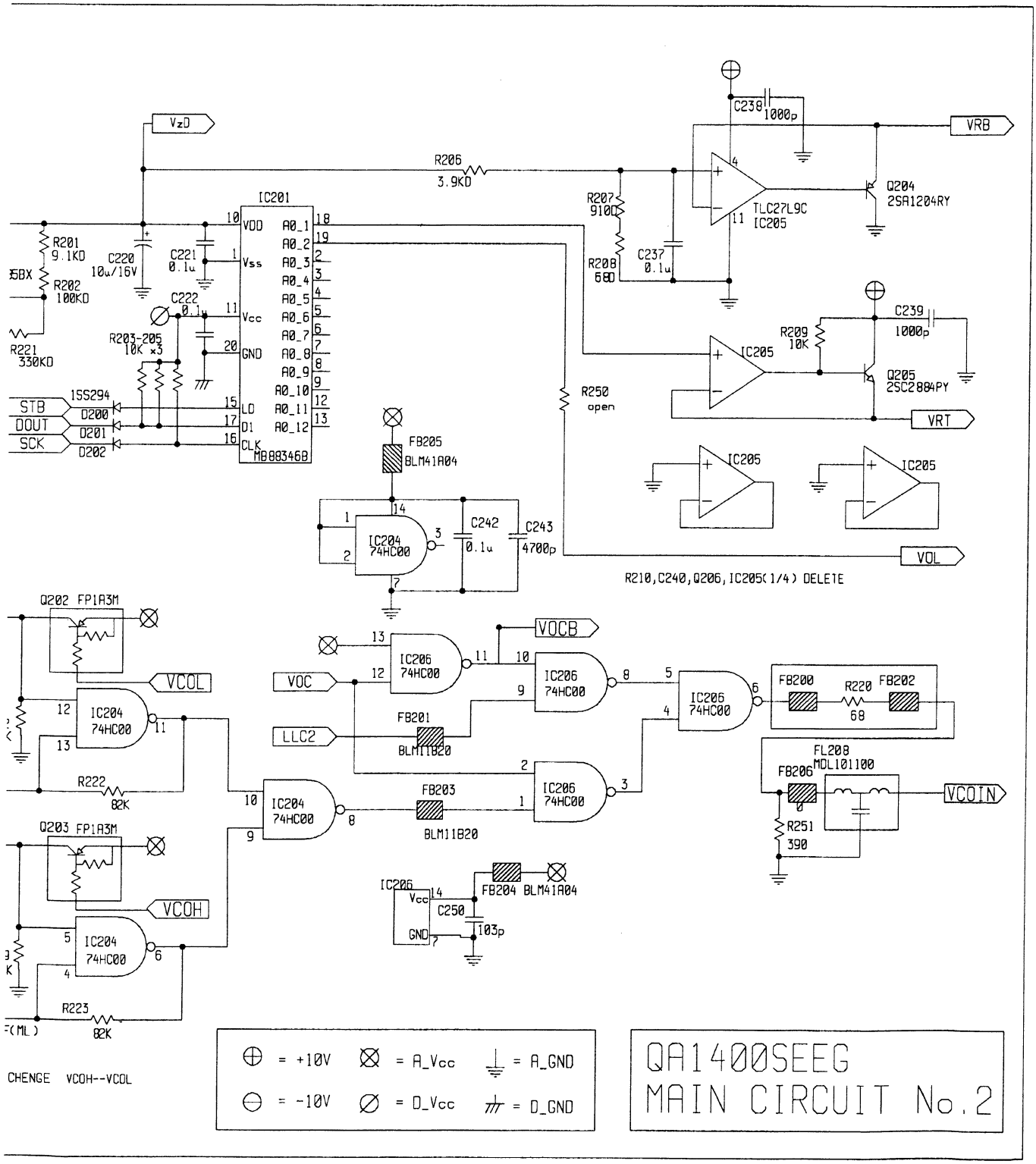


Fig.32 CIRCUIT DIAGRAM(MAIN CIRCUIT No.2)

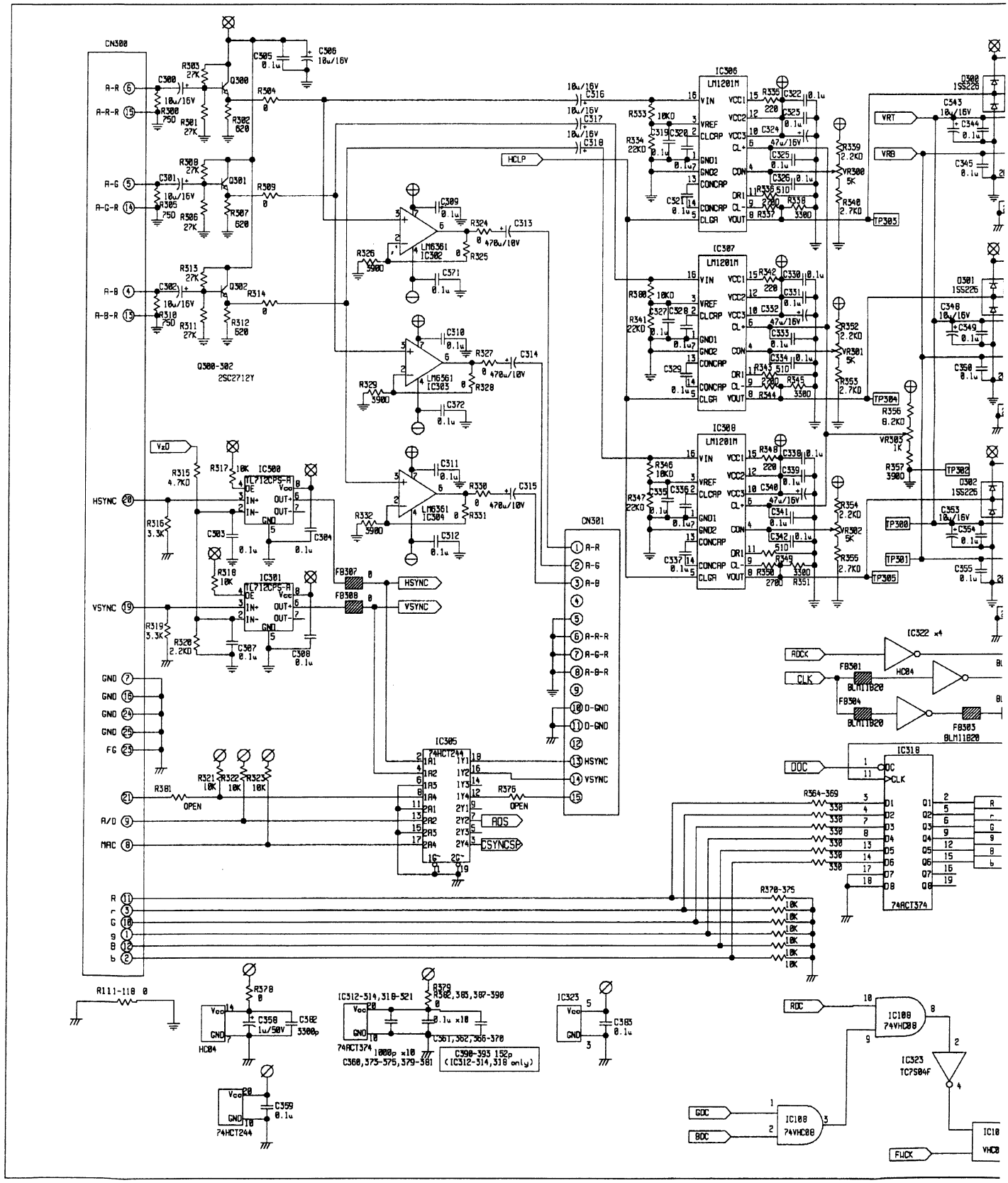


Fig.33 CIRCUIT DIAGRAM(MAIN CIRCUIT No.3)

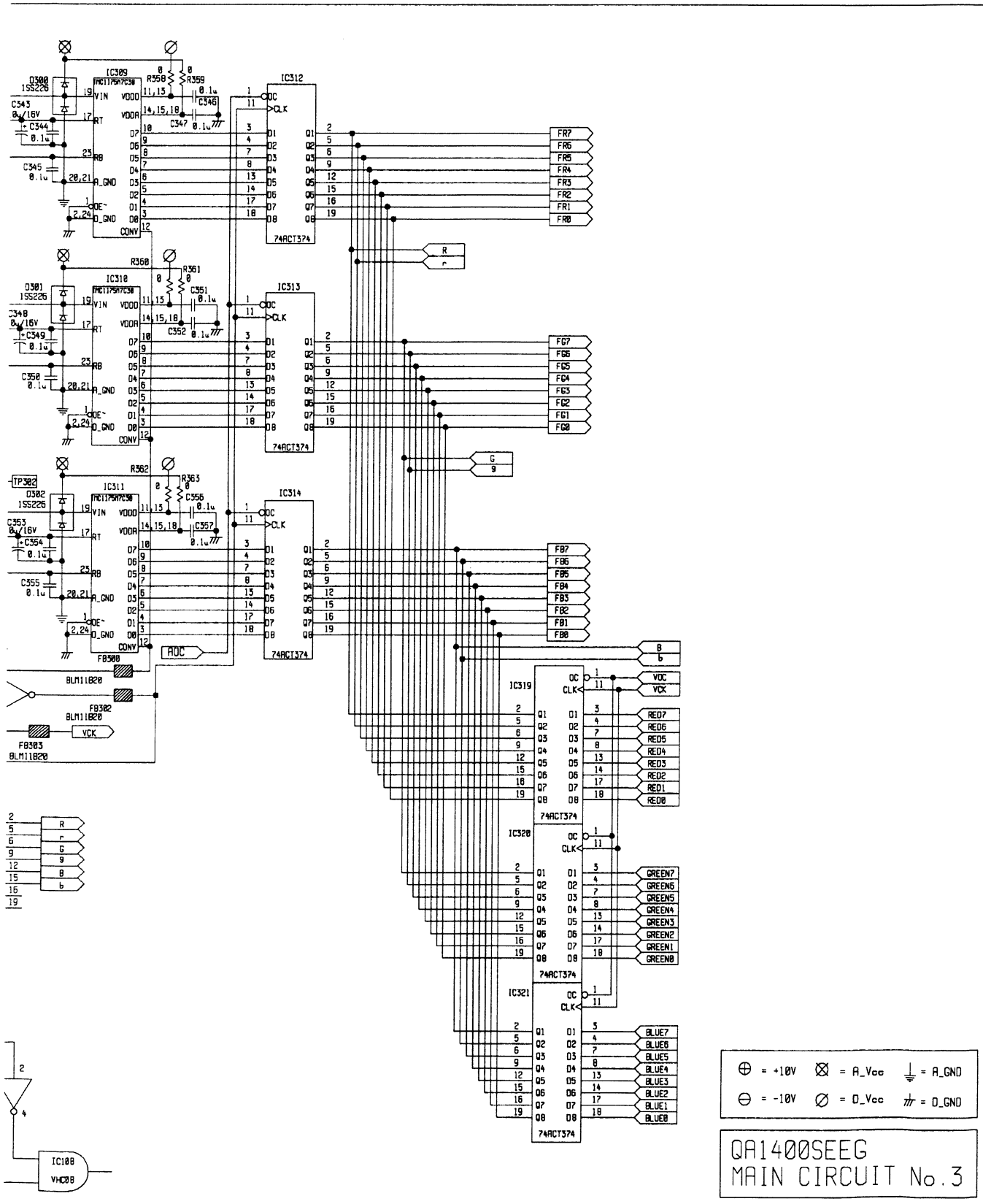


Fig.33 CIRCUIT DIAGRAM(MAIN CIRCUIT No.3)

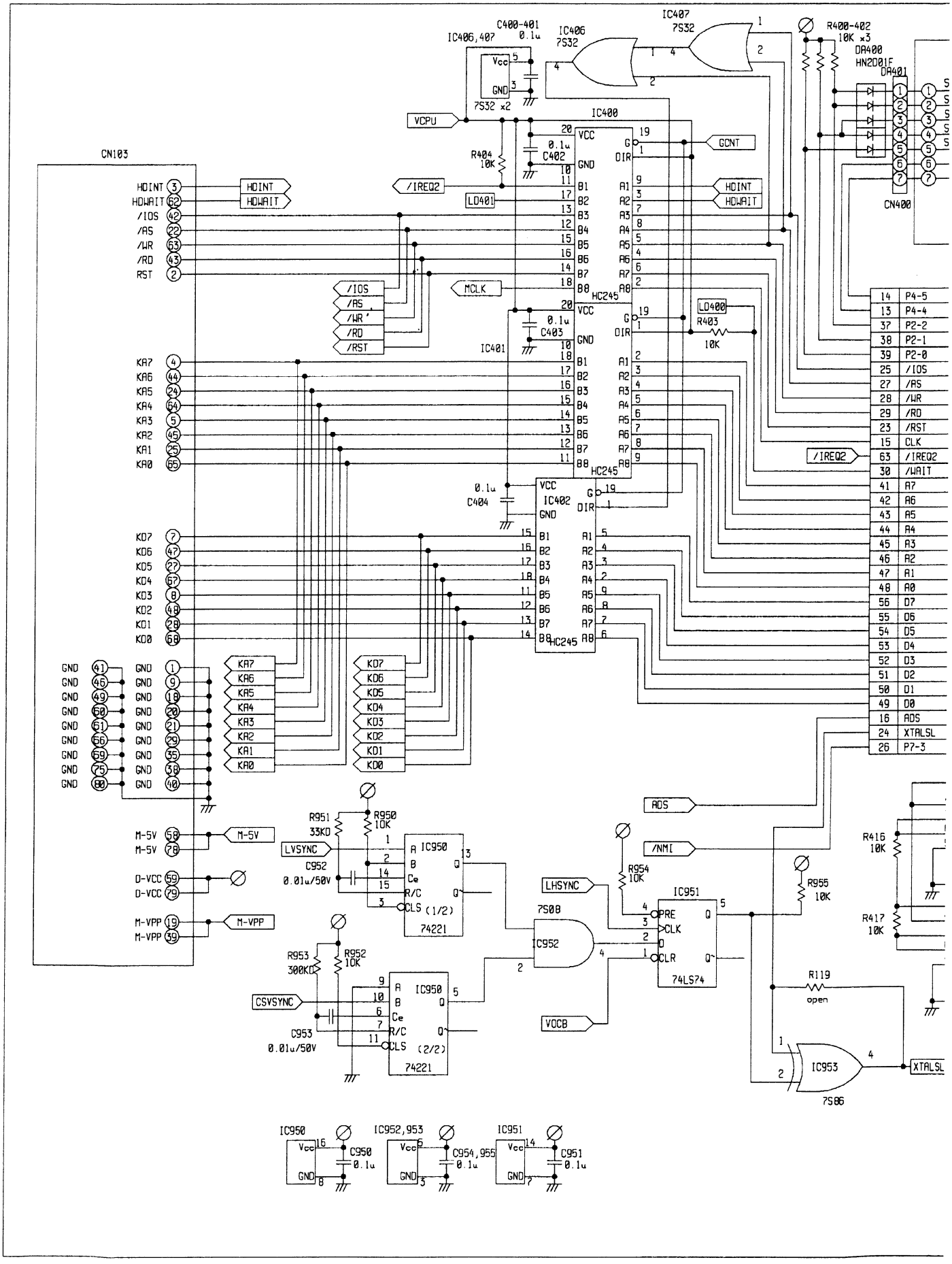


Fig.34 CIRCUIT DIAGRAM(MAIN CIRCUIT No.4)

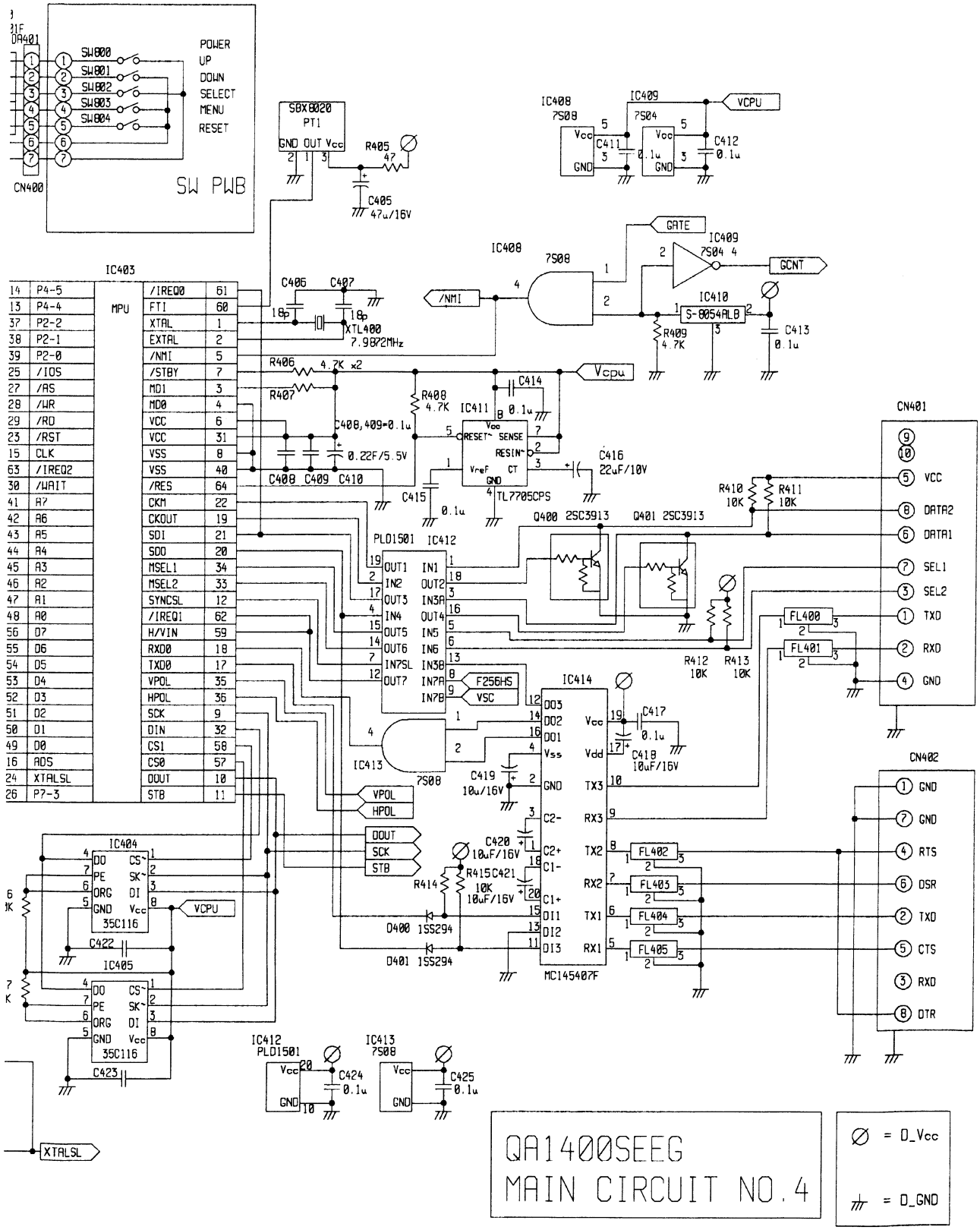


Fig.34 CIRCUIT DIAGRAM(MAIN CIRCUIT No.4)

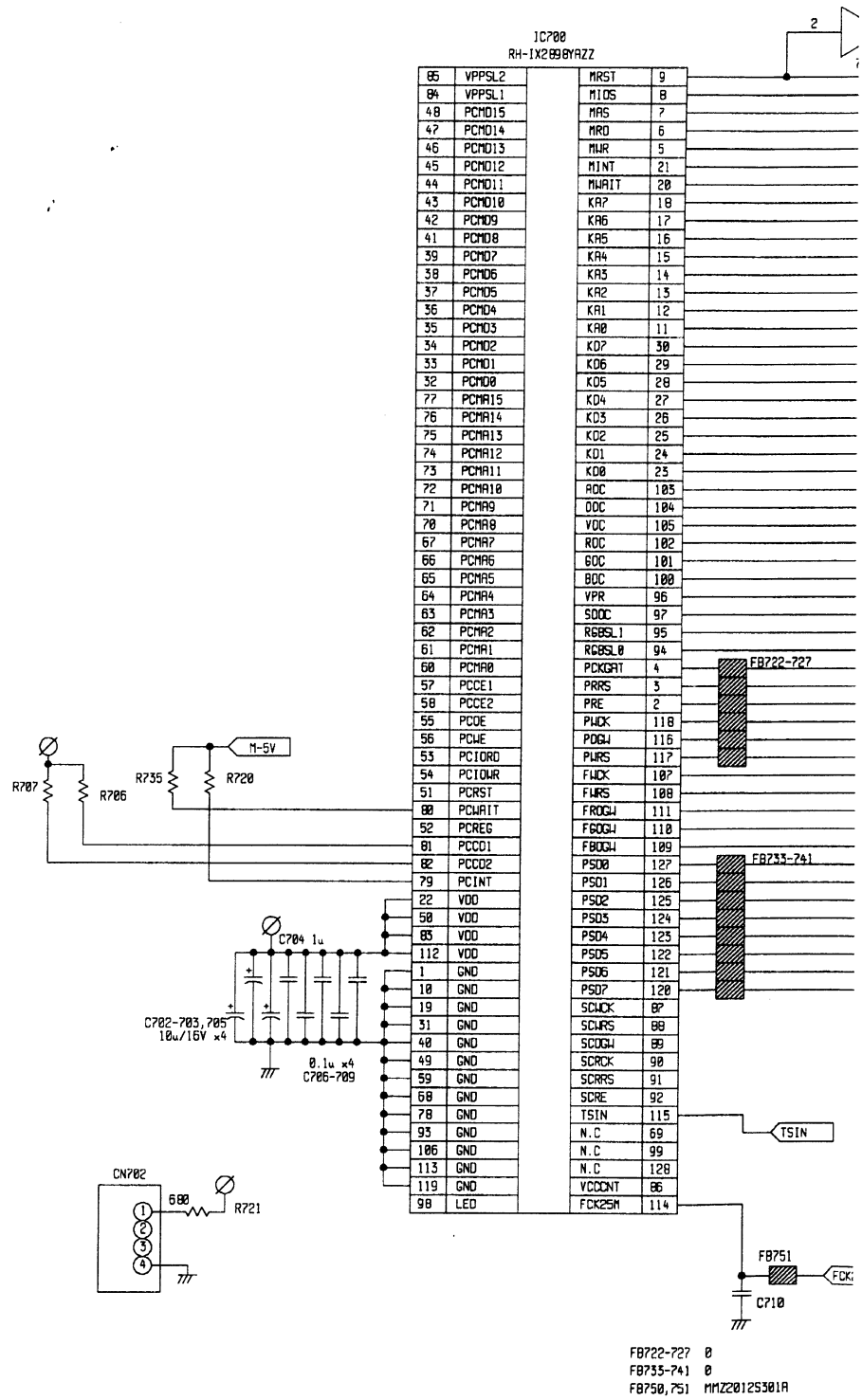


Fig.35 CIRCUIT DIAGRAM(SUB CIRCUIT)

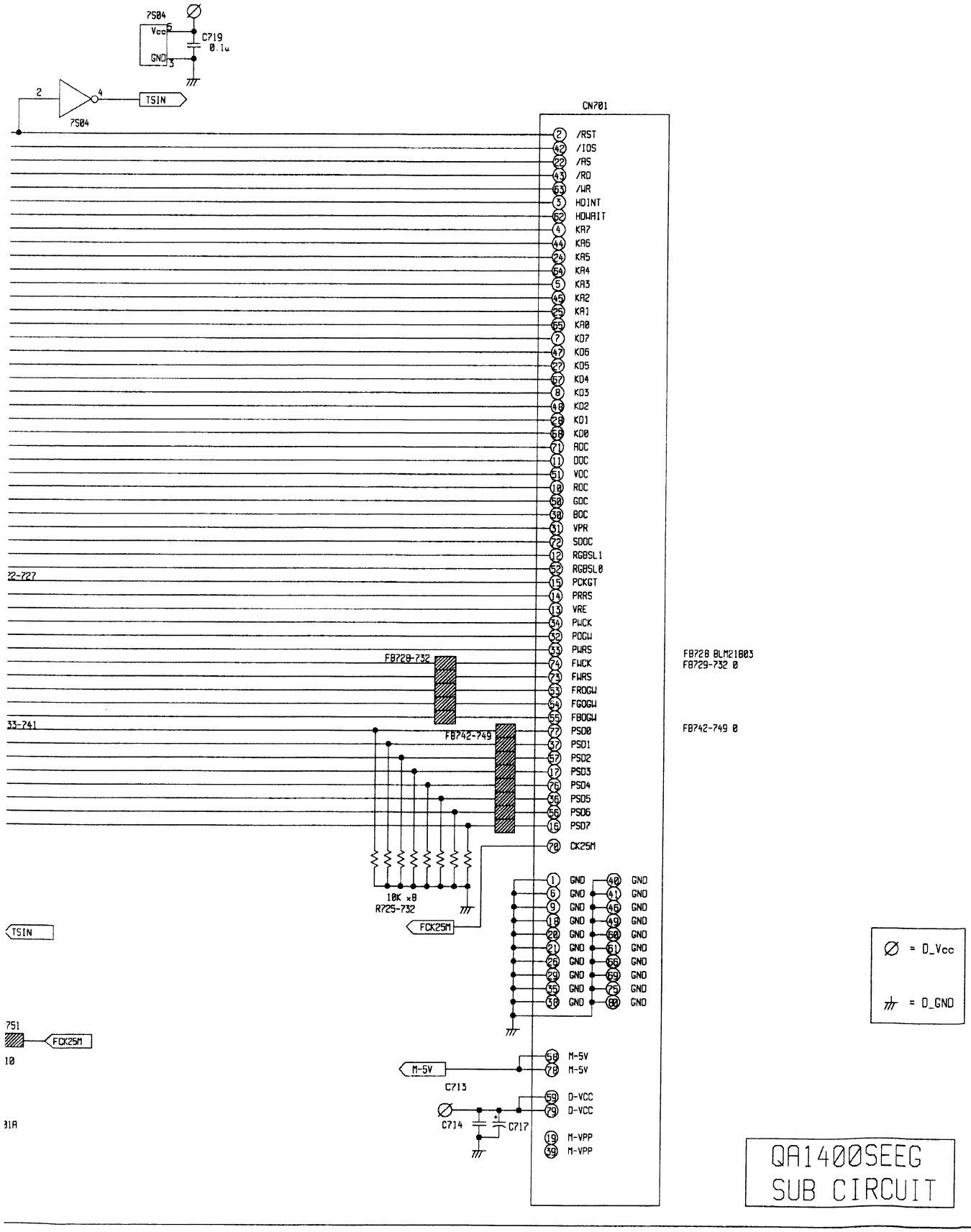


Fig.35 CIRCUIT DIAGRAM(SUB CIRCUIT)

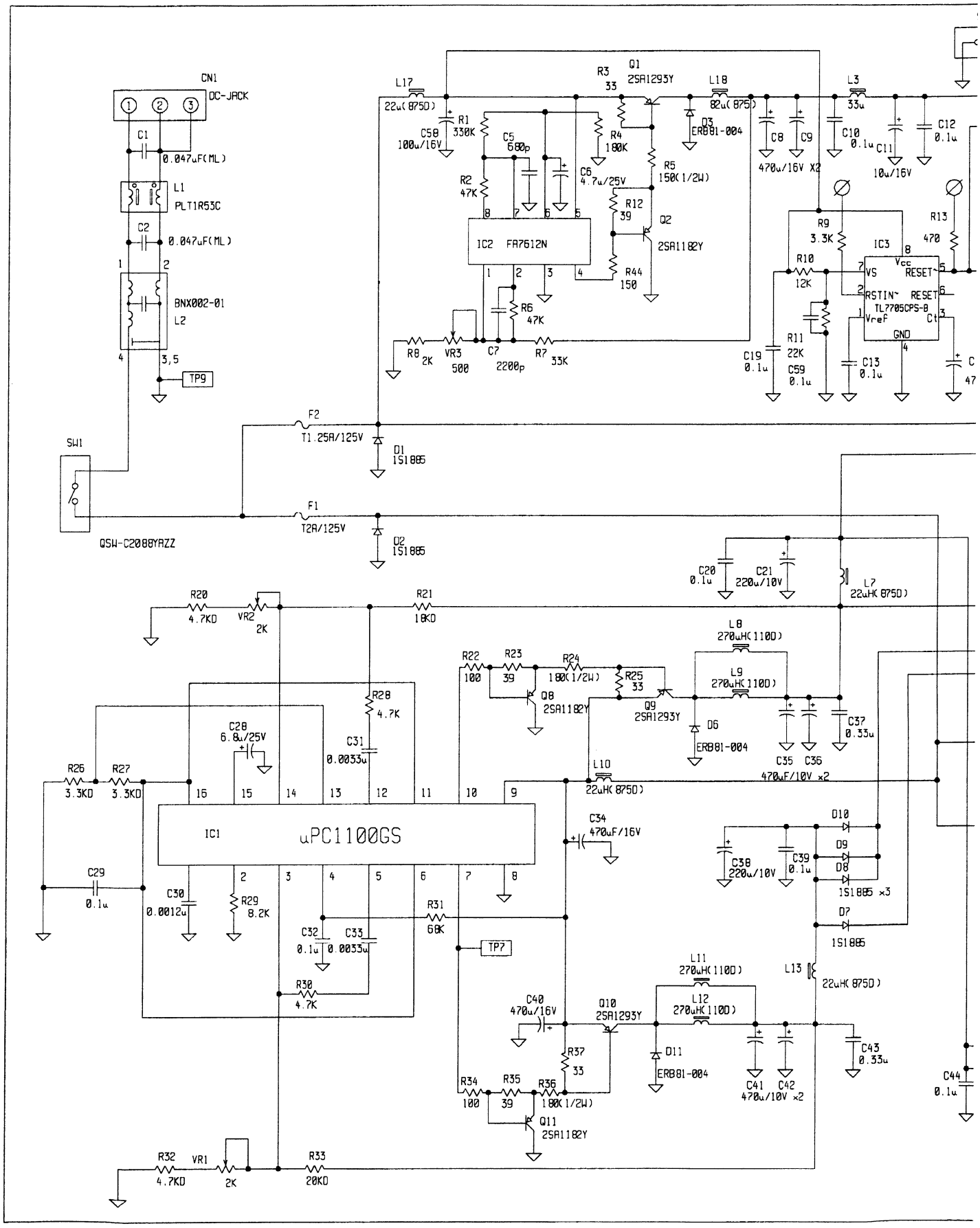


Fig.36 CIRCUIT DIAGRAM(POWER CIRCUIT)

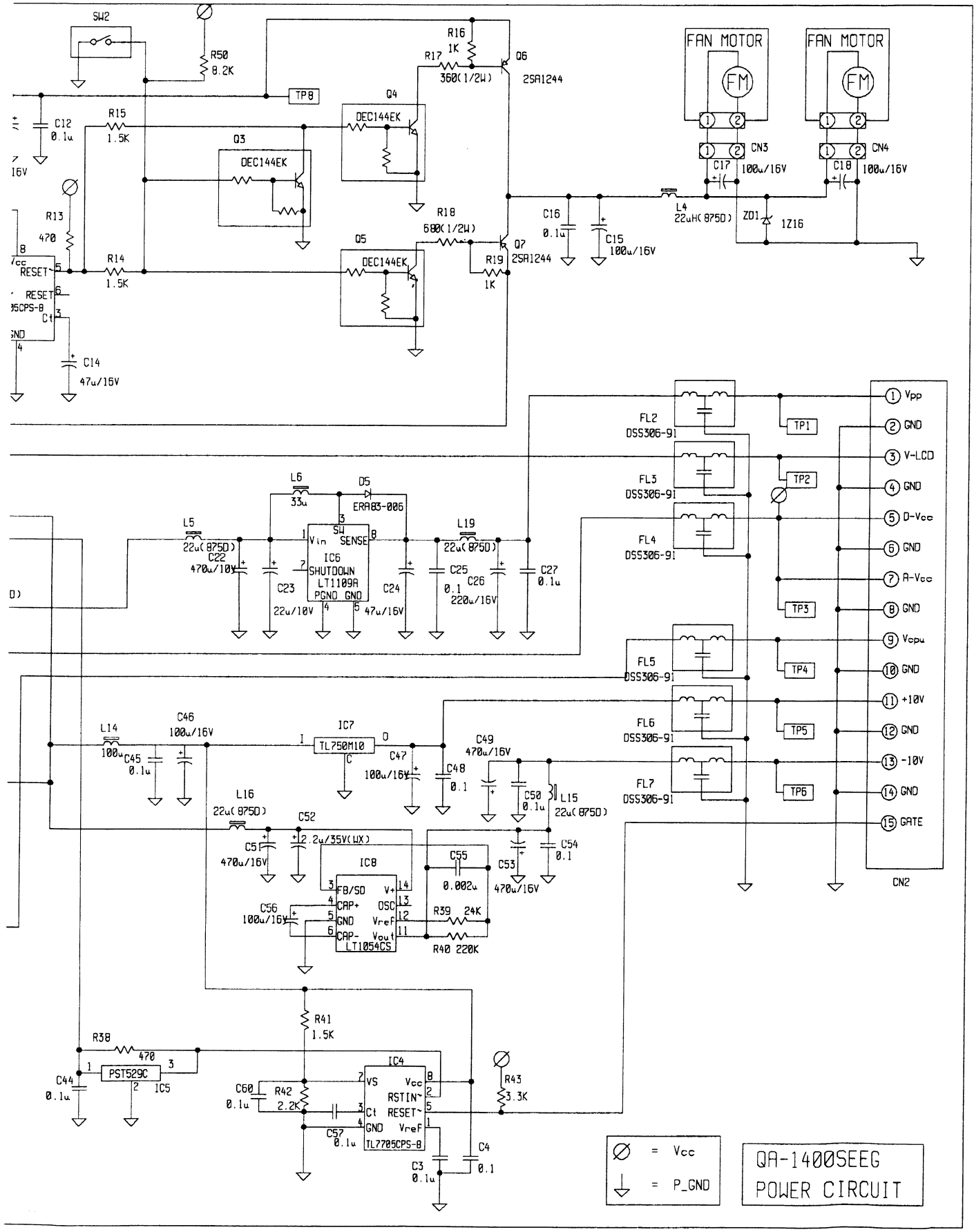


Fig.36 CIRCUIT DIAGRAM(POWER CIRCUIT)

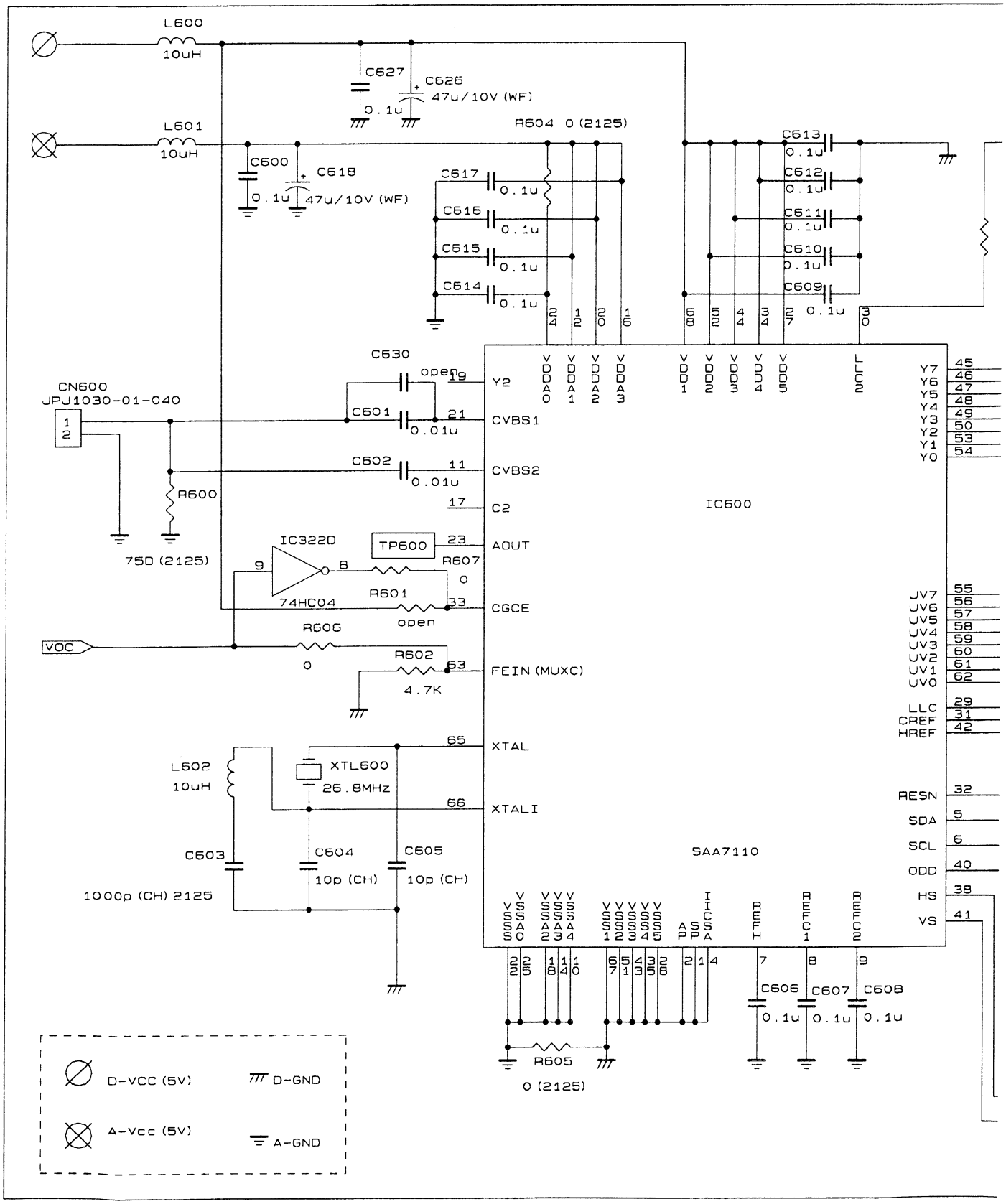


Fig.37 CIRCUIT DIAGRAM(VIDEO CIRCUIT)

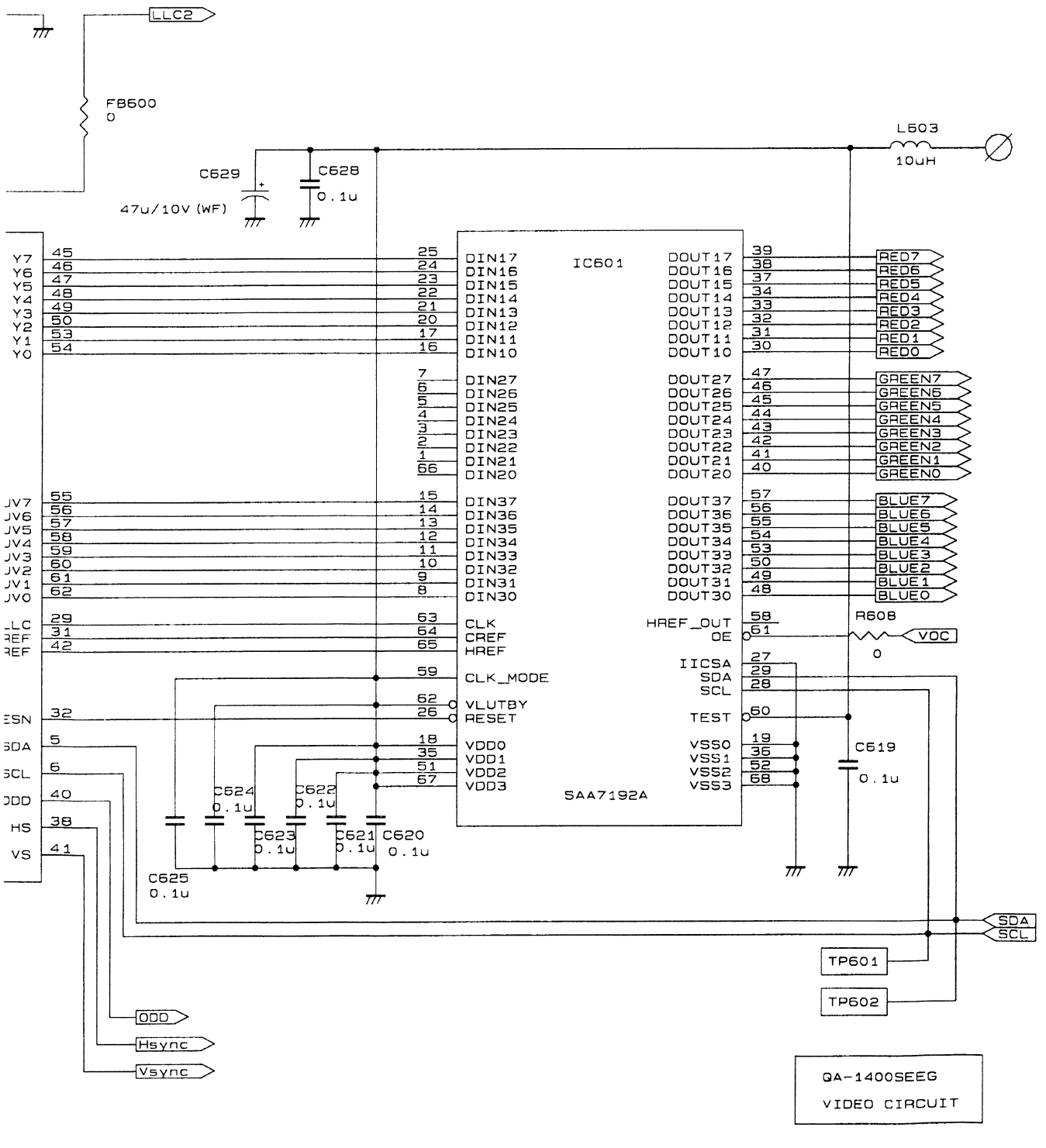


Fig.37 CIRCUIT DIAGRAM(VIDEO CIRCUIT)

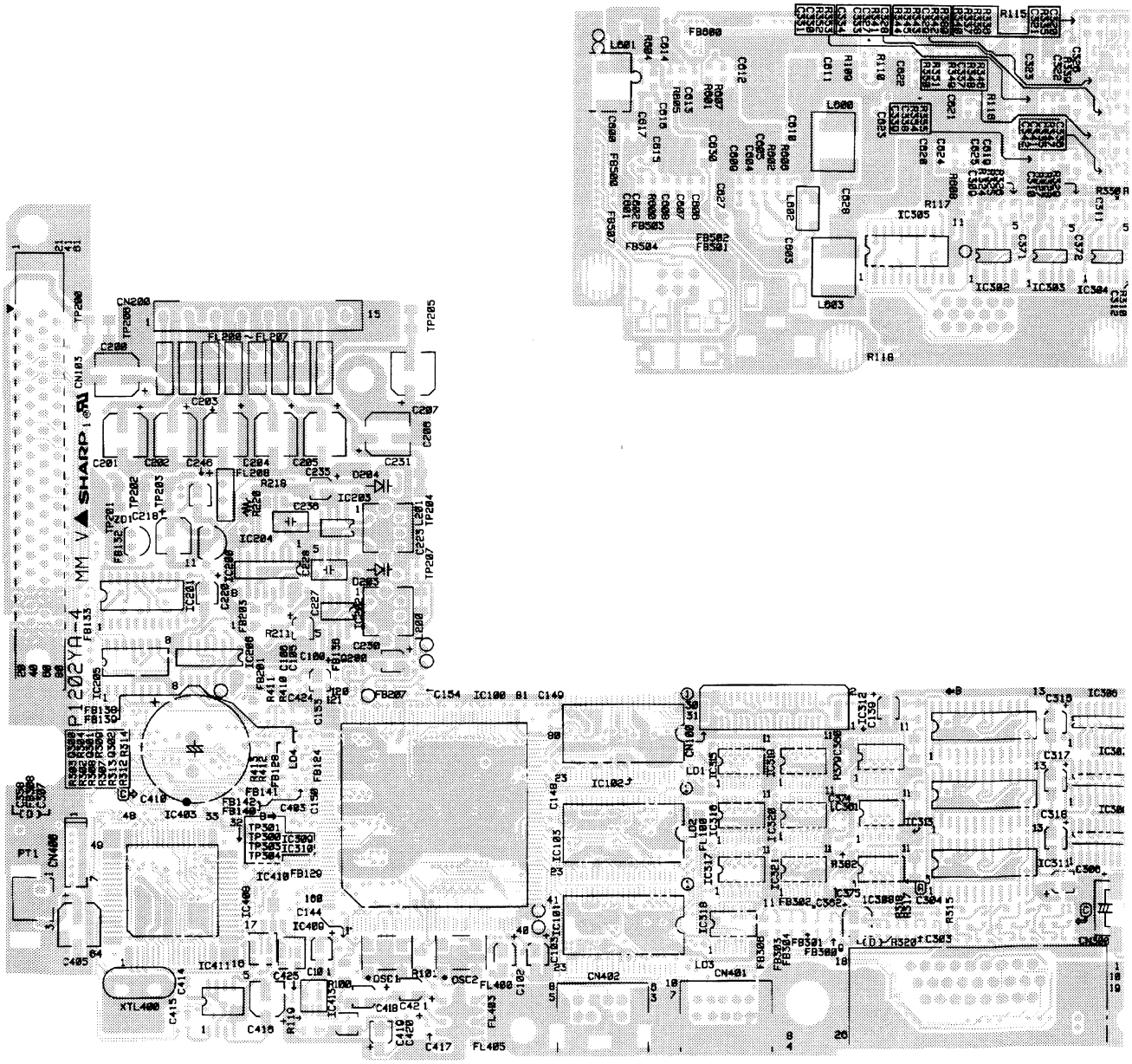
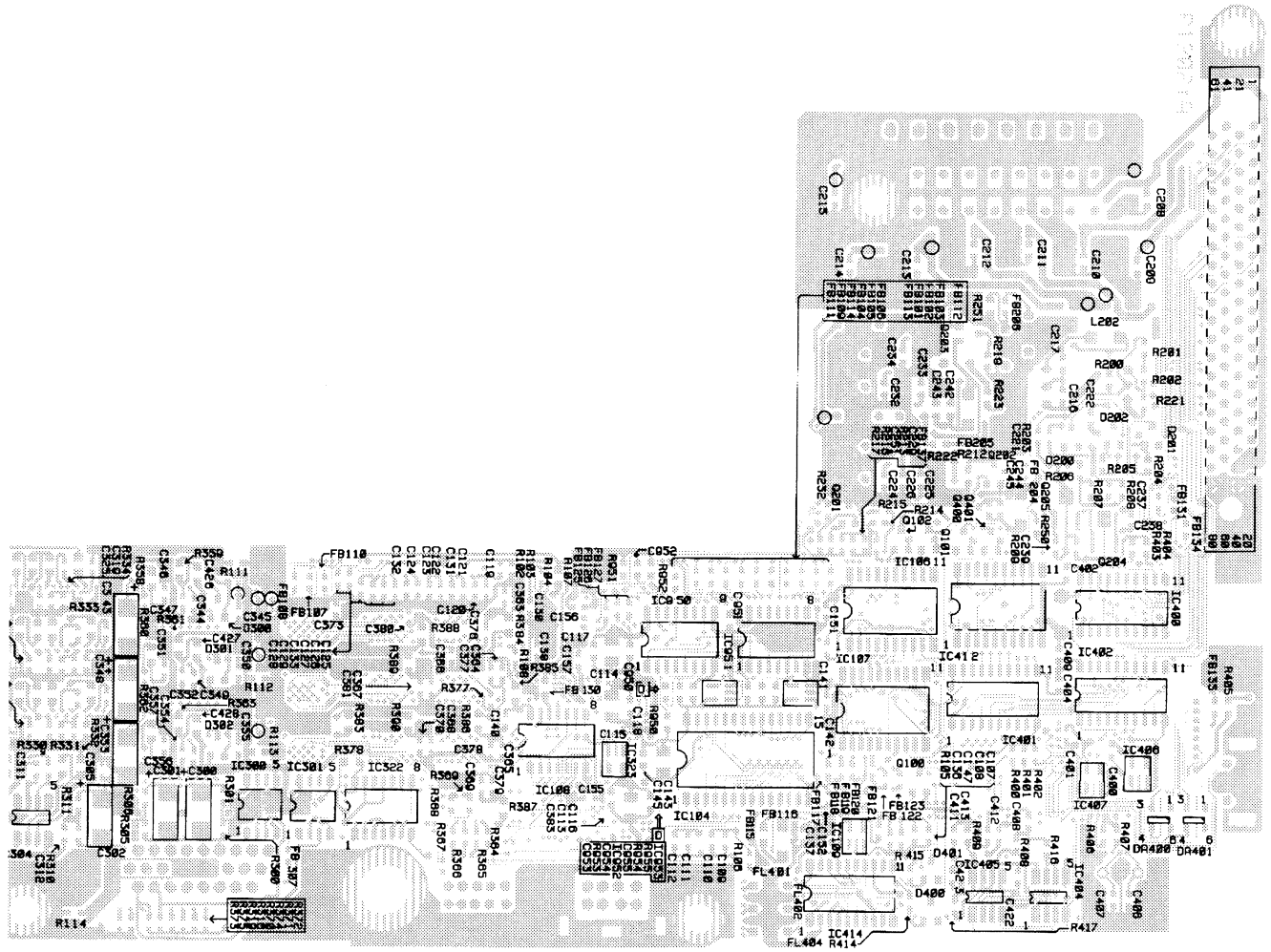


Fig.38 MAIN P.W.B. PATTERN



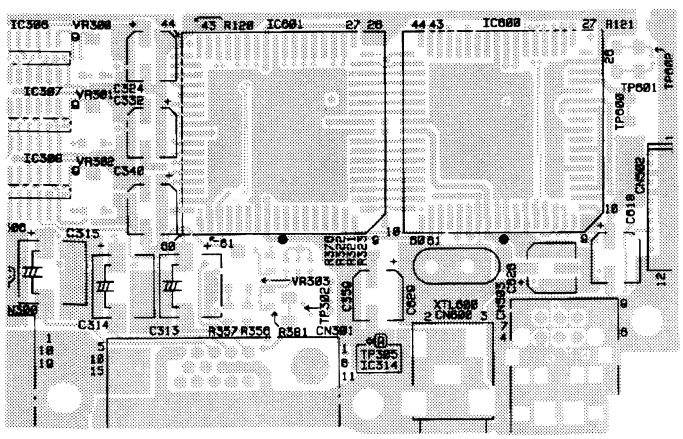


Fig.38 MAIN P.W.B. PATTERN

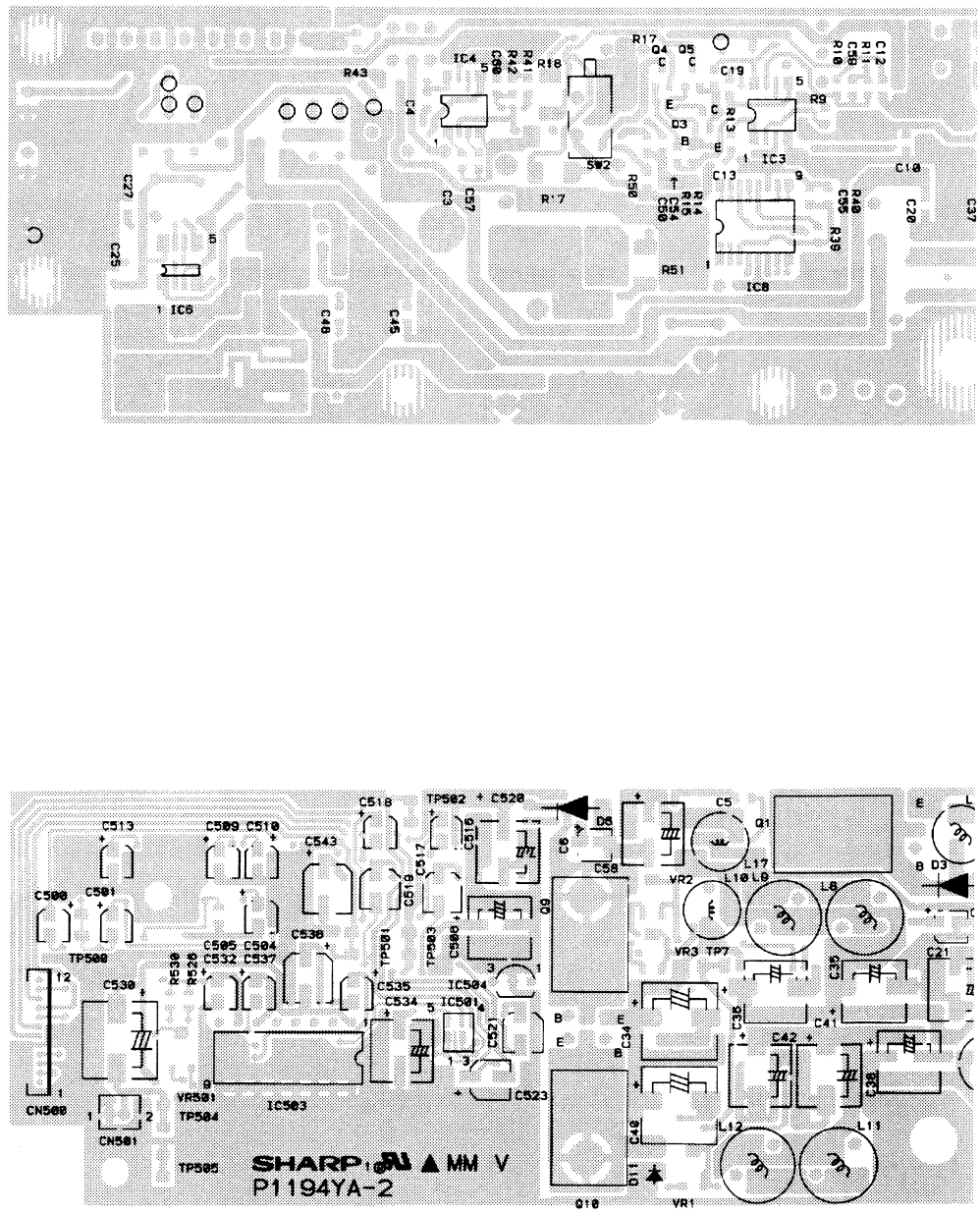
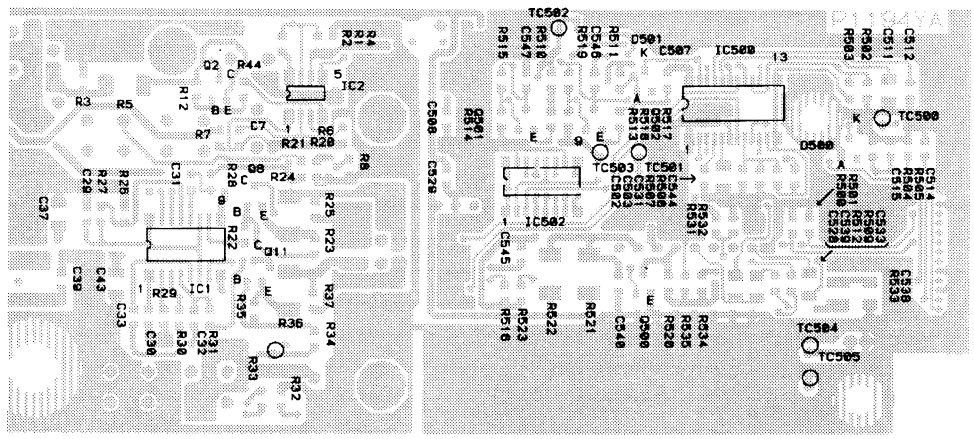


Fig.39 POWER P.W.B. PATTERN



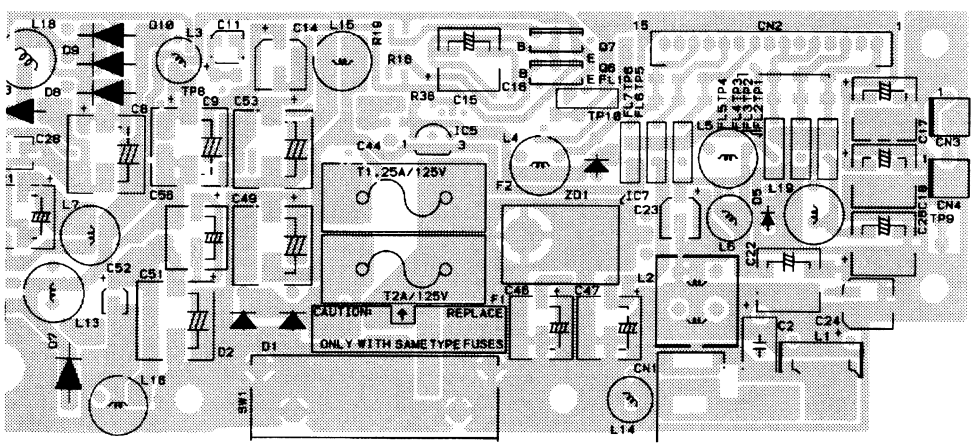


Fig.39 POWER P.W.B. PATTERN

7. REPLACEMENT PARTS LIST

"HOW TO ORDER REPLACEMENT PARTS"

To have your order filled promptly and correctly,
please furnish the following information.

1.MODEL NUMBER 2.REF.NO.
3.PART NO. 4.DESCRIPTION

No.	REF.No.	PART CODE	NEW	DESCRIPTION	QTY	PRICE
1.LCD						
⚠ 1		DUNTL2101YAZZ		TFT-LCD UNIT	1	EV
2.FAN MOTOR						
1		DFUNP0006YAZZ		FAN MOTOR	2	BH
3.IC						
1	IC1	RH-IX1234PAZZ		uPC1100GS	1	AL
2	IC2	RH-IX2886YAZZ		FA7612N	1	AM
3	IC3,4	RH-IX0855PAZZ		TL7705CPS-B	2	AK
4	IC5	RH-IX2788YAZZ		PST529C	1	AG
5	IC6	RH-IX2885YAZZ		LT1109	1	AM
6	IC7	RH-IX2821YAZZ		TL750M10	1	AN
7	IC8	RH-IX2887YAZZ		LT1054	1	AM
8	IC100	RH-IX2893YAZZ		L7A1322	1	BF
9	IC101-103	RH-IX2862YAZZ		HM530281-25	3	BL
10	IC104	RH-IX2919YAZZ	N	IS62C256-70U	1	AV
11	IC106	RH-IX2921YAZZ	N	PLD1502	1	AQ
12	IC107	RH-IX2896YAZZ		PCF8584	1	AZ
13	IC108	RH-IX2872YAZZ		74VHC08	1	AD
14	IC109,409	RH-IX2650YAZZ		TC7S04	2	AC
15	IC200	RH-IX1233PAZZ		TL750L10	1	AM
16	IC201	RH-IX2866YAZZ		MB88346B	1	AS
17	IC202,203	RH-IX1235PAZZ		SP1648	2	AT
18	IC204,206	RH-IX1239PAZZ		74HC00	2	AE
19	IC205	RH-IX1236PAZZ		TLC27L9	1	AR
20	IC300,301	RH-IX0853PAZZ		TL712CPS-A	2	AQ
21	IC302-304	RH-IX2799YAZZ		LM6361	3	AS
22	IC305	RH-IX2909YAZZ		74HCT244	1	AK
23	IC306-308	RH-IX2818YAZZ		LM1201	3	AW
24	IC309-311	RH-IX2931YAZZ	N	TMC1175AM7C40	3	AY
25	IC312-314,318-321	RH-IX2899YAZZ		TC74ACT374AF (SSOP)	7	AQ
26	IC322	RH-IX2661YAZZ		74HC04	1	AD
27	IC400-402	RH-IX2910YAZZ		74HC245	3	AH
28	IC403	RH-IX2922YAZZ	N	HD6473256F6	1	BK
29	IC404,405	RH-IX2897YAZZ		35C116	2	AV
30	IC406,407	RH-IX2850YAZZ		TC7S32F	2	AC
31	IC408,413,952	RH-IX2832YAZZ		TC7S08F	3	AC
32	IC410	RH-IX2911YAZZ		S-8054ALB-LM-T1	1	AF
33	IC411	RH-IX0855PAZZ		TL7705CPS-B	1	AK
34	IC412	RH-IX2920YAZZ	N	PLD1501	1	AQ
35	IC414	RH-IX2849YAZZ		MC145407	1	AQ
36	IC600	RH-IX2888YAZZ		SAA7110	1	BQ
37	IC601	RH-IX2889YAZZ		SAA7192A	1	BQ
38	IC950	RH-IX2857YAZZ		TC74HC221AF	1	AH
39	IC951	RH-IX1133PAZZ		SN74LS74ANS	1	AE
40	IC953	RH-IX2917YAZZ		TC7S86	1	AE
4.DIODE						
1	D1,2,7-10	VHD1S1885//-1		1S1885	6	AB
2	D3,6,11	VHDERB81-004/		ERB81-004	3	AE
3	D5	VHDERA83-006/		era83-006	1	AD
4	D200-202,400,401	VHD1SS294//-1		1SS294	5	AA

No.	REF.No.	PART CODE	NEW	DESCRIPTION	QTY	PRICE
5	D203,204	VHD1SV211//-1		1SV211	2	AB
6	D300-302	VHD1SS226//-1		1SS226	3	AB
7	DA400,401	VHDHN2D01F/-1		HN2D01F	2	AC
8	ZD1	VHELM385BX/-1		LM385BX(MAIN PWB)	1	AV
9	ZD1	VHD1Z16////-1		1Z16(POWER PWB)	1	AW
5.FUSE						
⚠ 1	F1	QFS-F0003PAZZ		T2A/125V	1	AD
⚠ 2	F2	QFS-B0006PAZZ		T1.25A/125V	1	AD
3		QFSHA2008YAZZ		85PE1850	4	AA
6.CORE						
1	FB101-114,125-127	RCORF2024YAZZ		BLM11A12	17	AC
2	FB115	VRS-TW2AD101J		(1/10W) 100J	1	AA
3	FB116,R100,101	RCORF2028YAZZ		BLM32A06	3	AD
4	FB117-124,128,129,131,136,137,201,203,300-304	RCORF2030YAZZ			20	AC
5	FB130	RCORF2022YAZZ		MMZ2012S301	1	AB
6	FB132-135,138,139	RCORF2034YAZZ		BLM11A05	6	AC
7	FB204,205	RCORF2011YAZZ		BLM41A04	2	AE
8	FB200,202	RCORF0042PAZZ		CORE	2	AB
7.FILTER						
1	FL2-7,200-207	RFILN0004PAZZ		DSS306-91	14	AB
2	FL208	RMPT-2046YAZZ		MDL101 100	1	AH
3	FL400-405	RFILN0164PAZZ		NFM41R11C223	6	AE
8.COIL						
⚠ 1	L1	RCILZ2110YAZZ		PLT1R53C	1	AH
⚠ 2	L2	RCORF0058PAZZ		BNXOO2-01	1	AD
3	L3,6	RCILZ2105YAZZ		RCH-664D 33uH	2	AD
4	L4,5,7,10,13,15,16,17,19	RCILZ3877PAZZ		RCR-875D 22uH	9	AE
5	L8,9,11,12	RCILZ3878PAZZ		RCR-110D 270uH	4	AE
6	L14	RCILZ2109YAZZ		RCR-664D 100uH	1	AD
7	L18	RCILZ2132YAZZ		RCR-875D 82uH	1	AE
8	L200	RCILZ3875PAZZ		7KTLT 2.45uH	1	AD
9	L201	RCILZ3874PAZZ		7KTLT 1.15uH	1	AD
10	L202	VP-VD101K0000		LEM4532	1	AB
11	L600,601,603	RCILZ2133YAZZ		NW5650 10uH	3	AH
12	L602	VP-VD100K0000		LEM4532 10uH	1	AC
9.OSCILLATOR						
1	OSC1	RCRS-2123YAZZ		DSO751S 25.175MHz	1	AV
2	OSC2	RCRS-2124YAZZ		DS0751S 20.000MHz	1	AT
3	XTL400	RCRS-2129YAZZ		AT-51 7.987MHz	1	AS
4	XTL600	RCRS-2127YAZZ		26.8MHz	1	AL
10.PHOTO RECEIVER						
1	PT1	RRMCU2015YAZZ		SBX8020-F(RECEIVER)	1	AL
11.TRANSISTOR						
1	Q1,9,10	VS2SA1293Y/1E		2SA1293Y	3	AG
2	Q2,8,11	VS2SA1182-Y-1		2SA1182Y	3	AB
3	Q3-5	VSDTC144EK/-1		DTC144EK	3	AB
4	Q6,7	VS2SA1244Y/-1		2SA1244	2	AG
5	Q100-102,400,401	VS2SC3913//-1		2SC3913	5	AB
6	Q200	VSHN1C01FY/-1		HN1C01F-Y	1	AB
7	Q201	VS2SA1162SY-1		2SA1162Y	1	AA
8	Q202,203	VSFP1A3M///-1		FP1A3M	2	AC
9	Q204	VS2SA1204RY-1		2SA1204RY	1	AC
10	Q205	VS2SC2884PY-1		2SC2884PY	1	AC
11	Q300-302	VS2SC2712LY-1		2SC2712Y	3	AA

No.	REF.No.	PART CODE	NEW	DESCRIPTION	QTY	PRICE
12.SWITCH						
1	SW1	QSW-C2088YAZZ		POWER SW	1	AH
2	SW2	QSW-M2097YAZZ		SSCUL LEVER SWITCH	1	AL
13.VR						
1	VR1,2	RVR-M2276YAZZ		ST-4A 2K	2	AF
2	VR3	RVR-M2255YAZZ		ST-4A 0.5K	1	AF
3	VR300-302	RVR-M0216PAZZ		ST-4A 5K	3	AG
4	VR303	RVR-M2285YAZZ		ST-4A 1K	1	AG
14.CONNECTOR						
1	CN1	QSOCZ0115PAZZ		DA-JACK	1	AC
2	CN2	QPLGZ0433PAZZ		PH-15P	1	AE
3	CN3,4	QPLGZ0253PAZZ		2PIN CONNECTOR(FOR FAN)	2	AD
4	CN100	QCNCW0033KAZZ		LCD CONNECTOR(31P)	1	AK
5	CN103	QPLGJ2716YAZZ		TX14 (80P)(FOR MEMORY PWB)	1	AW
6	CN200	QPLGZ0433PAZZ		PH-15P	1	AE
7	CN300	QPLGJ2730YAZZ		D-SUB (26pin)	1	AX
8	CN301	QPLGJ2731YAZZ		D-SUB (15pin)	1	AX
9	CN400	QPLGJ2714YAZZ		CONNECTOR FOR SWITCH PWB	1	AC
10	CN401	QPLGJ2721YAZZ		TCS7705-012010(FOR MOUSE)	1	AL
11	CN402	QPLGJ2722YAZZ		TCS7282-01-211(FOR SERIAL)	1	AL
12	CN600	QSOCZ2031YAZZ		JPJ1030-01-040(FOR VIDEO)	1	AD
15.RESISTER						
1	R1	VRS-TW2AD334J		(1/10W) 330KJ	1	AA
2	R2,6	VRS-TW2AD473J		(1/10W) 47KJ	2	AA
3	R3,25,37	VRS-TW2AD330J		(1/10W) 33J	3	AA
4	R4	VRS-TW2AD184J		(1/10W) 180KJ	1	AA
5	R5	VRS-TW2HD151J		(1/2W) 150J	1	AB
6	R7,951	VRN-TV2AQ333D		(1/10W) 33KD	2	AA
7	R8	VRN-TV2AQ202D		(1/10W) 2KD	1	AA
8	R9,43	VRS-TW2AD332J		(1/10W) 3.3KJ	2	AA
9	R10	VRS-TW2AD123J		(1/10W) 12KJ	1	AA
10	R11	VRS-TW2AD223J		(1/10W) 22KJ	1	AA
11	R12,23,35	VRS-TW2AD390J		(1/10W) 39J	3	AA
12	R13,38	VRS-TW2AD471J		(1/10W) 470J	1	AA
13	R14,15,41	VRS-TW2AD152J		(1/10W) 1.5KJ	3	AA
14	R16,19,513,517,520	VRS-TW2AD102J		(1/10W) 1KJ	5	AA
15	R17	VRS-TW2HD361J		(1/2W) 360J	1	AB
16	R18	VRS-TW2HD681J		(1/2W) 680J	1	AA
17	R20,32	VRN-TV2AQ472D		(1/10W) 4.7KD	2	AA
18	R21	VRN-TV2AQ183D		(1/10W) 18KD	1	AA
19	R22,34,532	VRS-TW2AD101J		(1/10W) 100J	3	AA
20	R24,36	VRS-TW2HD181J		(1/2W) 180J	2	AA
21	R26,27	VRN-TV2AQ332D		(1/10W) 3.3KD	2	AA
22	R28,30	VRS-TW2AD472J		(1/10W) 4.7KJ	2	AA
23	R29,50	VRS-TW2AD822J		(1/10W) 8.2KJ	2	AA
24	R31	VRS-TW2AD683J		(1/10W) 68KJ	1	AA
25	R33	VRN-TV2AQ203D		(1/10W) 20KD	1	AA
26	R39	VRN-TV2AQ243D		(1/10W) 24KD	1	AA
27	R40	VRN-TV2AR224D		(1/10W) 220KD	1	AB
28	R42	VRS-TW2AD222J		(1/10W) 2.2KJ	1	AA
29	R44	VRS-TW2AD151J		(1/10W) 150J	1	AA
30	R102,104,105,108,111-118,304,309,314,324,327,330,606-608,FB140-142,206,207,307,308	VRS-CY1JD0000		(1/16W) 0	28	AA

No.	REF.No.	PART CODE	NEW	DESCRIPTION	QTY	PRICE
31	R107,325,328,331,358-363,378,382-390,604,605,FB600	VRS-TW2AD0000		(1/10W) 0	21	AA
32	R109,110,203-205,209,212,219,317,318,321-323,370-375,400-404,410-417,950,952,954,955	VRS-CY1JD103J		(1/16W) 10KJ	36	AA
33	R130	VRS-CY1JD561J		(1/16W) 560J	1	AA
34	R200,215	VRN-CY1JQ681D		(1/16W) 680D	2	AA
35	R201	VRN-CY1JQ912D		(1/16W) 9.1KD	1	AA
36	R202	VRN-CY1JR104D		(1/16W) 100KD	1	AA
37	R206	VRN-CY1JQ392D		(1/16W) 3.9KD	1	AA
38	R207	VRN-CY1JQ911D		(1/16W) 910D	1	AA
39	R208	VRN-CY1JS680D		(1/16W) 68D	1	AA
40	R211,218	VRS-TQ2BD0000		(1/8W) JUMPER	2	AA
41	R213,221	VRN-CY1JR334D		(1/16W) 330KD	2	AA
42	R214,232,315	VRN-CY1JQ472D		(1/16W) 4.7KD	3	AA
43	R216,217	VRS-CY1JD222J		(1/16W) 2.2KJ	2	AA
44	R220	VRD-ST2DF680J		(1/5W) 68J	1	AA
45	R222,223	VRS-CY1JD823J		(1/16W) 82KJ	2	AA
46	R251	VRS-TW2AD391J		(1/10W) 390J	1	AA
47	R300,305,310	VRN-CY1JS750D		(1/16W) 75D	3	AA
48	R301,303,306,308,311,313	VRS-CY1JD273J		(1/16W) 27K	6	AA
49	R302,307,312	VRS-CY1JD621J		(1/16W) 620J	3	AA
50	R316,319	VRS-CY1JD332J		(1/16W) 3.3KJ	2	AA
51	R320	VRN-CY1JQ222D		(1/16W) 2.2KD	1	AA
52	R326,329,332,357	VRN-TV2AQ391D		(1/10W) 390D	4	AA
53	R333,346,380	VRN-CY1JQ103D		(1/16W) 10KD	3	AA
54	R334,341,347	VRN-CY1JQ223D		(1/16W) 22KD	3	AA
55	R335,342,348	VRS-TW2AD221J		(1/10W) 220J	3	AA
56	R336,343,349	VRN-TV2AS510D		(1/10W) 51D	3	AA
57	R337,344,350	VRN-TV2AQ271D		(1/10W) 270D	3	AA
58	R338,345,351	VRN-TV2AQ331D		(1/10W) 330D	3	AA
59	R339,352,354	VRN-TV2AQ222D		(1/10W) 2.2KD	3	AA
60	R340,353,355	VRN-TV2AQ272D		(1/10W) 2.7KD	3	AA
61	R356	VRN-TV2AQ822D		(1/10W) 8.2KD	1	AA
62	R364-369	VRS-CY1JD331J		(1/16W) 330J	6	AA
63	R405	VRS-CY1JD470J		(1/16W) 47J	1	AA
64	R406-409,602	VRS-CY1JD472J		(1/16W) 4.7KJ	5	AA
65	R600	VRN-TV2AS750D		(1/10W) 75D	1	AA
66	R721	VRS-TW2AD681J		(1/10W) 680J	1	AA
67	R953	VRN-CY1JR304D		(1/16W) 300KD	1	AA
16.CAPACITOR						
1	C1,2	RC-QZS473AFYK		(FILM) 473p/50V	2	AF
2	C3,4,10,12,13,16,19,20,25,27,29,32,39,44,45,48, 50,54,57,59,60	VCKYTV1EF104Z		(2125) F/0.1uF/Z/25V	21	AA
3	C5	VCCCTV1H3681J		(2125) CH/680pF/J/50V	1	AB
4	C6	VCEAPH1EC475M		(WX) 4.7u/25V	1	AC
5	C7,55	VCKYTV1HB222K		(2125) B/2200pF/K/50V	2	AA
6	C8,9,34,40,49,51,53	VCEAPZ1CC477M		(UR) 470u/16V	7	AC
7	C11	VCEAPH1CC106M		(WX) 10u/16V	1	AC
8	C14,24	VCEAPS1CC476M		(WX) 47u/16V	2	AC
9	C15,17,18,46,47,56,58	VCEAPZ1CC107M		(UR) 100u/16V	7	AC
10	C21,38	VCEAPZ1AC227M		(UR) 220u/10V	2	AC

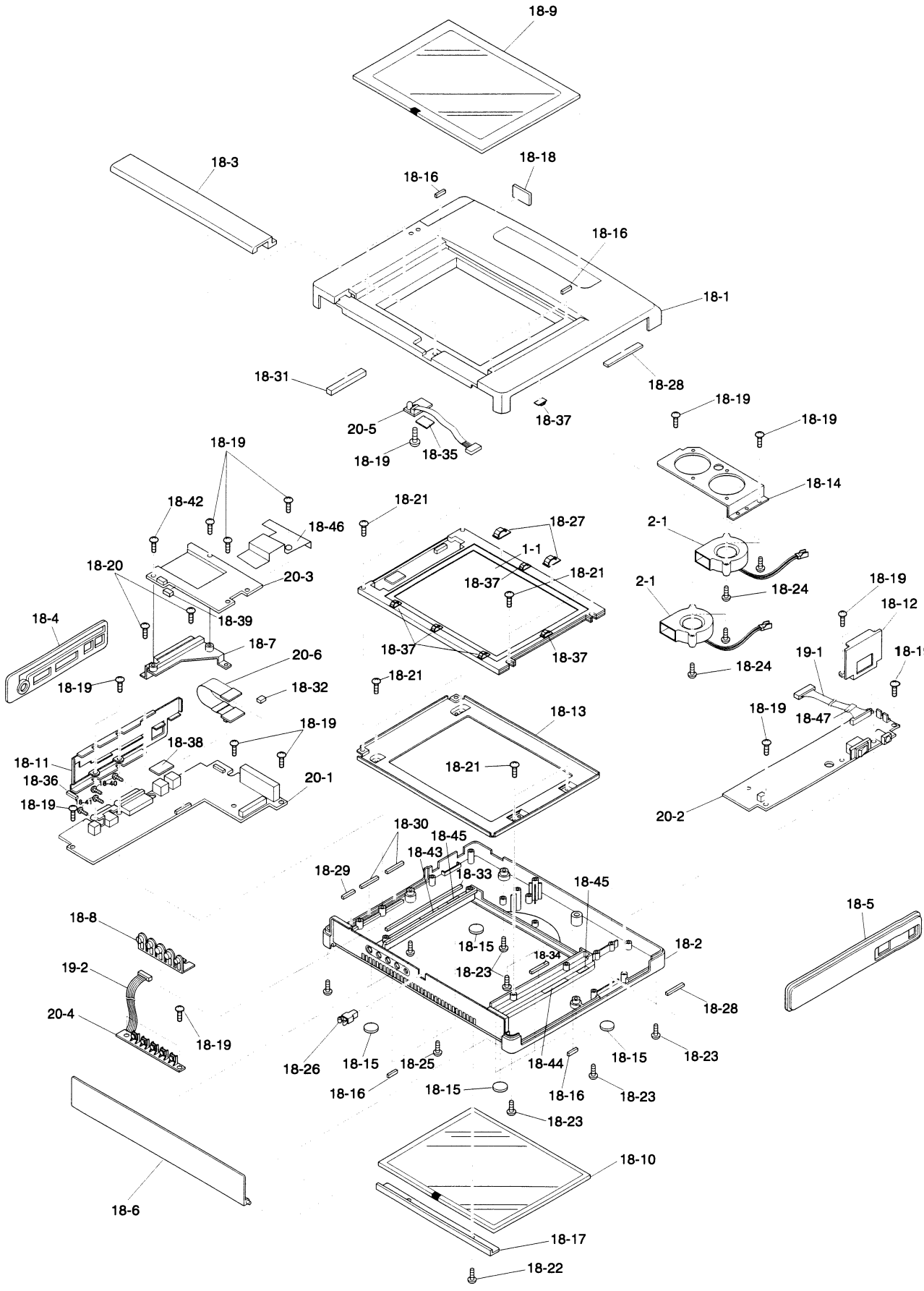
No.	REF.No.	PART CODE	NEW	DESCRIPTION	QTY	PRICE
11	C22,35,36,41,42	VCEAPZ1AC477M		(UR) 470u/10V	5	AD
12	C23	VCEAPS1AC226M		(WX) 22u/10V	1	AC
13	C26	VCEAPZ1CC227M		(UR) 220u/16V	1	AC
14	C28	VCEAPL1EN685M		(WF) 6.8u/25V	1	AD
15	C30	VCKYTV1HB122K		(2125) B/1200pF/K/50V	1	AA
16	C31,33	VCKYTV1HB332K		(2125) B/3300pF/K/50V	2	AA
17	C37,43	VCKYTQ1EF334Z		(2125) F/0.44uF/Z/25V	2	AB
18	C52	VCEAPH1VC225M		(WX) 2.2u/35V	1	AC
19	C100-103,139,220,227, 235,246,306,316- 318,418 -421	VCEAPH1CC106M		(WX) 10u/16V	17	AC
20	C105-112,116-118,138, 140-142,145,147- 157,208- 217,221,222,224 - 226,232- 234,237,242,251,303- 305,307-312,319- 323,325-331,333-339, 341,342.344-347,349- 352,354- 357,359,361,362,366- 372,383,400- 404,408,409,411 - 415,417,422-425,600, 606-617,619- 625,627,628, 950,951,954,955	VCKYCY1EF104Z		(1608) Z/0.1uF/Z/25V	144	AA
21	C113-115,143	VCKYTQ1CF105Z		(3216) F/1uF/Z/16V	4	AC
22	C119-133	VCCCCY1H3470J		CH/47pF/J/50V	15	AA
23	C136,137,223,231,601, 602,952,953	VCKYCY1HB103K		(1608) B/0.01uF/K/50V	8	AA
24	C170,382	VCKYBT1CX332M		X/3300pF/M/16V	2	AB
25	C200- 207,324,332,340,405	VCEAPS1CC476M		(WX) 47u/16V	12	AC
26	C218	VCEAPS1CC226M		(WX) 22u/16V	1	AC
27	C228,236	RC-QZS103AFYK		(FILM) 0.01uF/50V	2	AF
28	C229	VCCCCY1H3101J		(1608) CH/ 100pF/J/50V	1	AA
29	C230	VCEAPH1EC475M		(WX) 4.7u/25V	1	AC
30	C238,239,360,373- 375,379-381	VCKYCY1HB102K		(1608) B/1000pF/K/50V	9	AA
31	C243	VCKYTV1HB472K		(2125) B/4700pF/K/50V	1	AA
32	C250	VCKYPA1HF103Z		F/0.01uF/Z/50V	1	AB
33	C300-302,343,348,353	VCSATJ1CH106M		(F94) 10u/16V	6	AK
34	C313-315	VCEAPZ1AC477M		(UR) 470u/10V	3	AD
35	C358	VCEAPH1HC105M		(WX) 1u/50V	1	AC
36	C390-393	VCKYPA1HB152K		B/1500pF/K/50V	4	AB
37	C406,407	VCCCCY1H3180J		(1608) CH/18pF/J/50V	2	AA
38	C410	RC-EZ2622YAZZ		0.22uF/5.5V	1	AK
39	C416	VCEAPS1AC226M		(WX) 22u/10V	1	AC
40	C603	VCCCTV1H3102J		(2125) CH/1000pF/J/50V	1	AA
41	C604,605	VCCCCY1H3100D		(1608) CH/10pF/D/50V	2	AA
42	C618,626,629	VCEAPL1AN476M		(WF) 47u/10V	3	AD
17.OTHER PARTS						
1		PSPAK0040PAZZ		SPACER	4	AA
2		LX-BZ0172PAZZ		SCREW 3P+10S	4	AC
3		LX-NZ0026PAZZ		NUT	4	AA

	No.	REF.No.	PART CODE	NEW	DESCRIPTION	QTY	PRICE
	18.CABINET PARTS						
⚠	1	No.18-1	DCABA2037YASA	N	CABINET A ASSEMBLY	1	BM
⚠	2	No.18-2	GCABB2039YASA		CABINET B	1	BH
	3	No.18-3	LFRM-2008YASA		FRAME FOR GLASS	1	AN
	4	No.18-4	GWAKP2014YASA	N	OPERATION FRAME A	1	AF
	5	No.18-5	GWAKP2015YASA	N	OPERATION FRAME B	1	AG
	6	No.18-6	GCOVH2009YASA		FRONT LID	1	AK
	7	No.18-7	PSPAK2089YASA		SPACER FOR MEMORY PWB	1	AG
	8	No.18-8	JBTN-2050YASA		OPERATION BUTTON	1	AG
⚠	9	No.18-9	PGLSN2011YASA		GLASS A	1	AX
⚠	10	No.18-10	PGLSN2012YASA		GLASS B	1	BD
	11	No.18-11	LANGK2057YASA		ANGLE A	1	AK
	12	No.18-12	LANGK2048YASA		ANGLE B	1	AG
	13	No.18-13	LANGK2056YASA		ANGLE FOR LCD	1	AQ
	14	No.18-14	LANGK2050YASA		ANGLE FOR FAN	1	AG
	15	No.18-15	PCUS-2034YAZZ		FOOT RUBBER	4	AB
	16	No.18-16	PCUS-2036YAZZ		CUSHION FOR GLASS	12	AA
	17	No.18-17	LFRM-2009YASA		ALUMINIUM FRAME	1	AV
	18	No.18-18	PFILW2004YAZZ		RECEIVER COVER	1	AE
	19	No.18-19	XYBSD30P08000		SCREW M3+8	20	AA
	20	No.18-20	XYBSF30P10000		SCREW M3+10	2	AA
	21	No.18-21	XQBSF30P08000		SCREW M3+8	8	AA
	22	No.18-22	XBSSC30P06000		SCREW M3+6	2	AA
	23	No.18-23	XYBSF30P12000		SCREW M3+12	7	AA
	24	No.18-24	XBBSD40P20000		SCREW M4+20	4	AA
	25	No.18-25	XBBSC30P10000		SCREW M3+10	1	AA
	26	No.18-26	LHLD-2019YAZZ		LATCH	1	AF
	27	No.18-27	LHLDW2013YAZZ		CORD CLAMP	2	AC
	28	No.18-28	PCUS-2038YAZZ		CUSHION	1	AG
	29	No.18-29	PCUS-2060YAZZ		CUSHION	1	AF
	30	No.18-30	PCUS-2061YAZZ		CUSHION	2	AF
	31	No.18-31	PCUS-2062YAZZ		CUSHION	1	AM
	32	No.18-32	PCUS-2048YAZZ		CUSHION	1	AE
	33	No.18-33	PCUS-2078YAZZ		CUSHION(FOR CABINET B ANGLE)	1	AP
	34	No.18-34	PCUS-2079YAZZ		CUSHION(FOR CABINET B ANGLE)	1	AK
	35	No.18-35	PCUS-2080YAZZ		CUSHION	1	AD
	36	No.18-36	MSPR-2010YAZZ		CUSHION	4	AG
	37	No.18-37	MSPR-2011YAZZ		CUSHION	6	AM
	38	No.18-38	MSPR-2014YAZZ		CUSHION(FOR MOUSE/SERIAL)	1	AN
	39	No.18-39	MSPR-2015YAZZ		CUSHION(FOR MEMORY PWB)	1	AG
	40	No.18-40	LX-BZ0311PAZZ		SCREW(FOR CN300)	2	AE
	41	No.18-41	LX-BZ0312PAZZ		SCREW(FOR CN301)	2	AE
	42	No.18-42	XYPSD30P08000		SCREW M3+8	1	AA
	43	No.18-43	PSHEG2112YAZZ		INSULATION SHEET A	1	AE
	44	No.18-44	PSHEG2113YAZZ		INSULATION SHEET B	1	AE
	45	No.18-45	PSHEG2114YAZZ		INSULATION SHEET C	2	AE
	46	No.18-46	PSHEG2115YAZZ		INSULATION SHEET D	1	AE
	47	No.18-47	RCORF2017YAZZ		CORE(FOR AUDIO/POWERCABLE)	1	AM
	19.OTHERS						
	1		QCNCM2560YAZZ		POWER CABLE	1	AR
	2		QCNCM2559YAZZ		SWITCH CABLE	1	AQ
⚠	3		DADP-2004YAZZ		AC ADAPTOR	1	BU
⚠	4		DACCV2005YAZZ		AC CORD(SEEG)	1	AZ
⚠	5		DACCV2002YAZZ		AC CORD(SUK)	1	BA
⚠	6		DSOCZ2047YAZZ		VGA CABLE	1	BM
⚠	7		DSOCZ2016YAZZ		MAC CABLE	1	BN
⚠	8		DSOCZ2030YAZZ		MONITOR THROUGH CABLE	1	BM

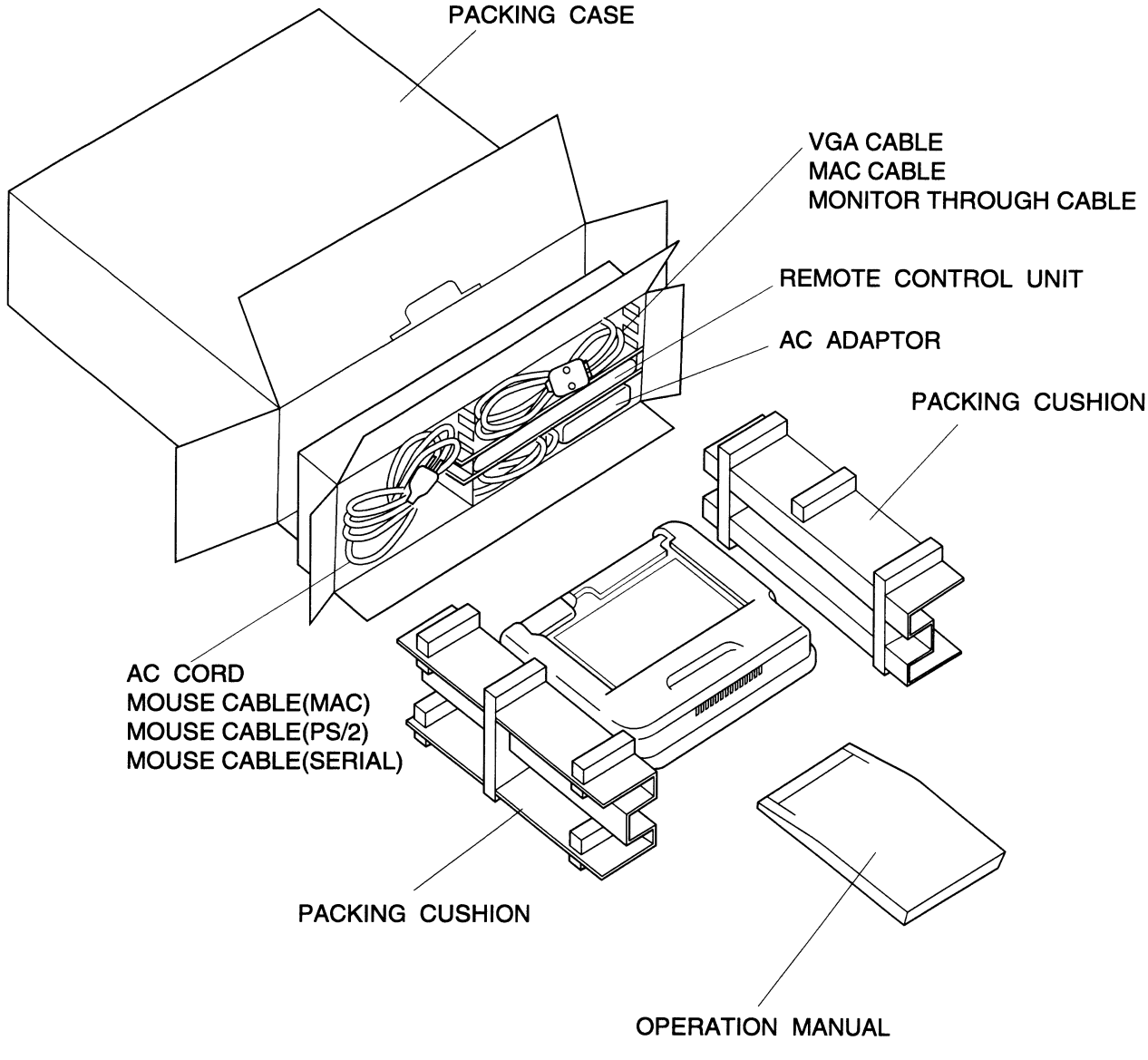
No.	REF.No.	PART CODE	NEW	DESCRIPTION	QTY	PRICE
9		DSOCZ2031YAZZ		MOUSE CABLE(MAC)	1	BB
10		DSOCZ2032YAZZ		MOUSE CABLE(PS/2)	1	BB
11		DSOCZ2033YAZZ		MOUSE CABLE(SERIAL)	1	BH
12		RRMCG2017YAZZ	N	REMOTE CONTROL UNIT	1	BR
13		TINSL2107YAZZ	N	OPERATION MANUAL(SEEG)	1	BC
14		TINSE2108YAZZ	N	OPERATION MANUAL(SUK)	1	AY
⚠ 15		TLABS2141YAZZ	N	DSP NUMBER LABEL(SEEG)	1	AD
16		TLABZ2119YAZZ		CAUTION LABEL	1	AC
20.PWB ASSEMBLY						
1	No.20-1	DPWB-2117YAZZ	N	MAIN PWB ASSEMBLY	1	DG
2	No.20-2	DPWB-2109YAZZ	N	POWER PWB ASSEMBLY	1	CF
3	No.20-3	DPWB-2110YAZZ	N	MEMORY PWB ASSEMBLY	1	BR
4	No.20-4	DPWB-2099YAZZ		SWITCH PWB ASSEMBLY	1	BA
5	No.20-5	DPWB-2111YAZZ	N	LED PWB ASSEMBLY	1	AU
6	No.20-6	DPWB-2101YAZZ		FPC CABLE ASSEMBLY	1	BH

Because parts marked with " ⚠ " is indispensable for the machine safety maintenance and operation, it must be replaced with the product specification.

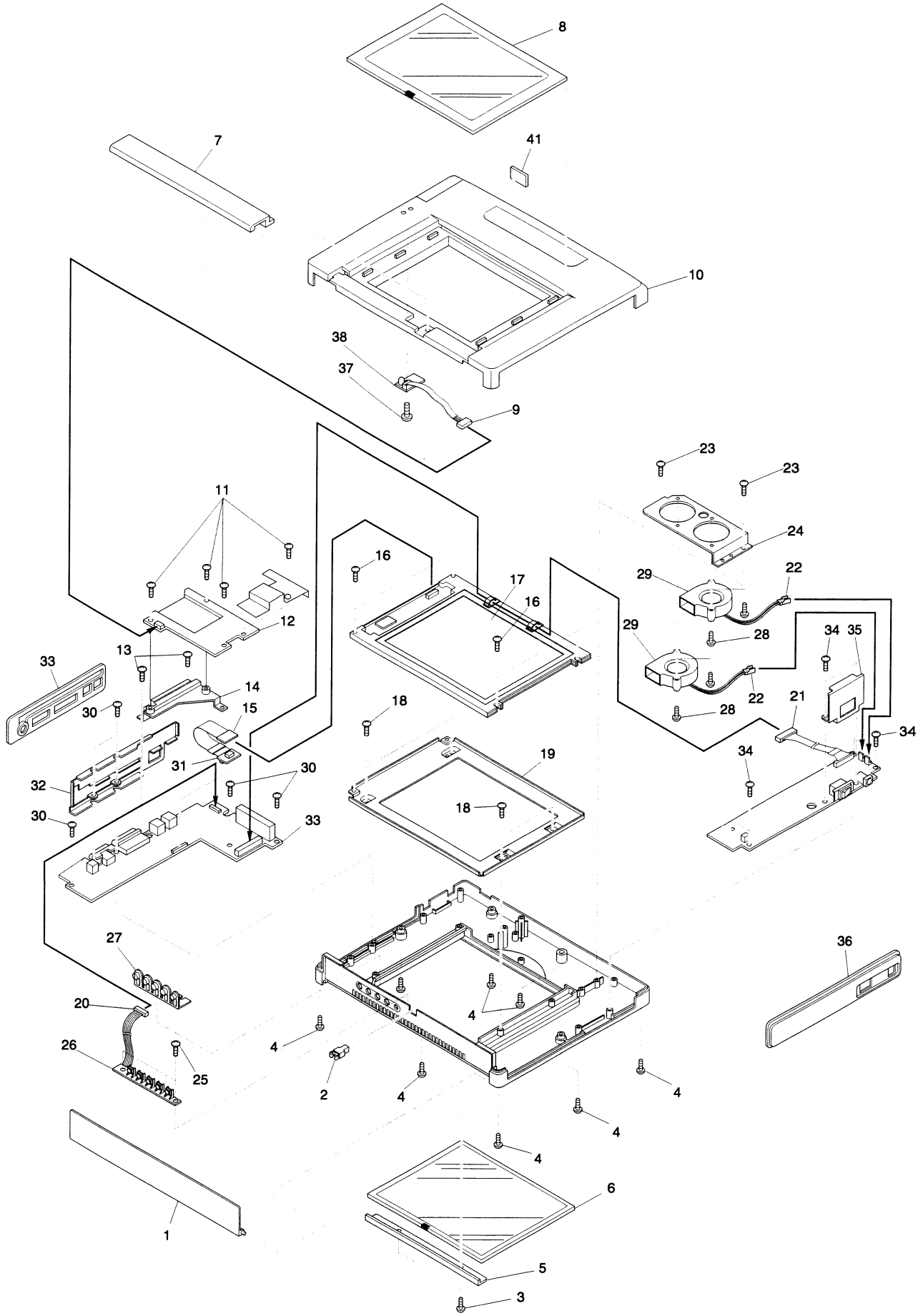
8. ASSEMBLY DRAWINGS



QA-1400 CABINET PARTS



QA-1400 PACKING OF THE SET



QA-1400 DISASSEMBLY AND REASSEMBLY